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OUR STEEL AND IRON INDUSTRIES.

We have received from Mr. James M. Swank, Secretary of the American Iron & Steel Association, his Directory of the Iron & Steel Works of the United States, embracing blast furnaces, rolling mills, steel works, forges, and bloomaries. It is the sixth edition and has a full numerical index to the names of all the iron and steel works in this country. The work records that up to July 25 of this year there were 686 complete blast furnaces in this country against 697 March 1, 1880, a decrease of 11, but their capacity stands 8,000,000 net tons a year, against 6,500,000 on March 1, 1880, the great increase being, as might be expected, among the bituminous furnaces, which advanced from a capacity of 2,800,000 net tons to 4,125,000 tons. Of blast furnaces, there are 203 bituminous, 228 anthracite, and 266 charcoal. Bituminous furnaces are increasing in number, while the others have decreased, The rolling mills and steel works have increased from 382 to 390, and 16 are now building. The capacity of the rolling mills in finished iron and steel has advanced from 5,250,000 net tons per annum to 7,000,000 tons. Last year the capacity of producing rails was limited to 2,150,000 tons, now our rail mills are equal to 3,110,000 tons, and this with a decrease in their number. There are 47 of these mills making heavy rails, and others are in course of erection. Trains of rolls now number 1,424. Nail factories have decreased, but with no lessening of production. There are now 66 nail factories with 4,030 machines in use. The number of Bessemer steel works has increased from 11 to 14, and of open-hearth steel works from 22 to 27, while the crucible steel works remain at 35. One Bessemer steel work and five open hearth steel works are now being built. The completed Bessemer steel works and the works building have a capacity of 2,250,000 net tons ingots a year, while on March 1, 1880, the works then existing and building claimed a capacity of but 1,750,000 tons. There are now 36 converters, with 2 building. The completed open-hearth steel works on March 1, 1880, had 33 Siemens furnaces, and the works building were expected to add 6 more; there are now 51 completed Siemens furnaces, and 10 building. The total annual capacity of the open-hearth steel works will be 500,000 net tons when the additions now being made are completed, while on March 1, 1880, the total annual capacity of completed and unfinished works was but 275,000 tons. The number of pots in the crucible steel works has increased from 3,080 to 3,490, with an increase in the annual capacity of the works from 90,000 net to 105,000 tons. There are 72 forges making wrought iron from iron ore, against 69 on March 1, 1881, but the actual capacity is now put at 75,000 tons, against 85,000 tons then. Of bloomaries working up scrap and pig iron there are now 52, with one building, against 59 on March 1, 1880; the annual capacity is now 70,000 net tons, against 80,000 tons then. The following is a summary of the productive capacity of the works named:

Works.	Net Tons, March 1, '80.	Net Tons, July 25, '82.
Blast furnaces	6,500,000	8,000,000
Rolling mills	5,250,000	7,000,000
Bessemer steel works	1,750,000	2,250,000
Open-hearth steel work	275,000	500,000
Crucible steel works	90,000	105,000
Forges	85,000	75,000
Bloomaries	80,000	70,000
Total	14,030,000	18,000,000

THE THOMAS-GILCHRIST STEEL PROCESS.

One most important event in metallurgical science is the application of what is known as the Thomas-Gilchrist process of steel making. This process is now yielding steel in this country and Europe at the rate of half a million tons per annum, and is destined to vast extension in application. Previously to the Bessemer and Siemens' processes all the steel that was made required for its production the best hematite pig metal and pure and rich ores of iron; rendering the product most costly; these processes revolutionized the steel trade. The Thomas-Gilchrist process renders steel makers further independent of rich iron ores, for by it clayband and blackband iron ores, and numerous varieties of ironstone which are remarkably rich in phosphorous, are made to furnish steel of very high quality. Up to the present no method has been discovered by which that element can be eliminated in the blast furnace or in the puddling furnace, and hence it passes into the pig iron made in the former and into the malleable or finished iron made by the aid of the latter. The very fact of pig metal from such ironstones being highly phosphoretic renders it specially adapted for treatment in steel making by the process devised by Messrs. Thomas & Gilchrist. This process is indiscriminately called by various names. One of them is derived from the names of the two inventors. Another is the "basic" process, which is due to the fact that the furnaces or (modified) Bessemer converters, in which the transformation of the phosphoretic pig metal takes place, are lined with ganister or other silicious material, which is, chemically speaking, of an acid nature, but rather by a material in which lime and magnesia (both basic compounds) are abundant. These bases readily take up and enter into union with the phosphoric acid as it is formed or eliminated from the pig metal, under the influence of the high temperature employed. To speak of it as the "dephosphorization" process has also become very customary, and such a term is strictly correct. Lastly, it is likewise called the "basic" Bessemer process, the reason for which is seen in the circumstance that, as chiefly carried out hitherto, the process is a modification of the Bessemer process of making steel, or a superaddition to it. It is impossible to speak in too high terms of the quality of the material so produced. In the manufacture of wire, it competes in Styria itself with the famous Styrian iron. The dephosphorized steel is made into rails, tyres, axles, long and cross sleepers for railway permanent way, boiler-plates, ship and tin-plates, bridge and roof iron, wire, bolts, rolled and welded locomotive tubes, and forgings of evory descaiption, while the scrap of the purified metal supplies an excellent material for use in the Siemens process; and it even appears certain that the scrap of the very pure and soft product constitutes an excellent raw material for use in the manufacture of crucible steel. Managers of large works in which the process is employed, and who are scientific metallurgists, affirm that as regards the quality of its products, the "basic" process is not only equal to the "acid" (or ordinary Bessemer) process, but that it is even superior to it. Boiler-plates made from dephosphorized ingot metal are at least equal to the best known brands in quality, and as compared with plates made of welded iron, the homogeneity of the new material, as well as its freedom from blow-holes and the remarkable ease with which it is worked, whether hot or cold, is greatly in its favor.

THE IRON STRIKE.

The members of the Amalgamated Association on strike are not likely to enter on a winter of "discontent." Good wages, if not up to the amount they would have enforced, are within their reach and will be accepted. The close of the strike is, in fact, a foregone conclusion, which is to be hailed alike in the interests of employers and employed. The effort to upset the pre-existing arrangement is allowed on all hands to have been premature and unwise. The course of employers has been persistently passive, the state of trade being such that they have been content to let matters drift along. Nothing has occurred to incline them to change their course of action. The Amalgamated Association has relied upon the fact that the policy of inaction could not be continued indefinitely, but the breaks that have occurred in its ranks, the restless dissatisfaction of the finishers, the circumstance that it is mainly the puddlers for whom these vast monetary sacrifices have been made, have demonstrated that there are benefits which may be bought too dear. The efforts to get the mills west of Pittsburgh and at other points to work in order to bring in revenue has not greatly relieved the treasury of the Association. Of number of mills in the west 18 per cent. are running in outright defiance of the Association. In causing 16 per cent. of the mills west of Pittsburgh to run, the Association has violated its rules, and proportionately weakened its coercive power. Even to the mills that have signed the Association has made important concessions. The backbone of the strike is undoubtedly broken, and full resumption of work on the old scale at Pittsburgh, Wheeling and Youngstown, has been proposed to the manufacturers and will be accepted by them, a resumption that will benefit numerous industries largely dependent on the iron trade.

INVENTORS IN THE MARKET.

One of the secrets of the rapid progress of invention in modern days is the practical encouragement afforded it in the publicity attaching to any improved devices, and the readiness with which capital can be secured for any solid advance in chemical science and constructive art. A new machine brought out, if of sterling merit, being widely advertised, creates in this country a wide demand. A host of our leading manufactories are solely dependent upon the growth of the demand for machines made in numbers. There are many mechanic productions which so long as the demand is limited, cannot be made profitably by expensive machines, and hand labor is resorted to. There are plants which will not pay unless thousands and even tens of thousands of given articles are turned out. We need scarcely remark that inventions that come into such general use as to justify a large outlay of capital in production are such as meet well defined and general needs, particularly in removing previous imperfections, doing work better and saving labor. An inventor often makes an improvement which is not important enough to justify any great investment of capital in pushing it. Further, a host of patents are taken out which do not rank higher than variations in form and processes, without compensation in the better accomplishment of results. Many inventions are made by chance, but most can be traced to men who with suggestive minds have a good knowledge of the class of work to which their inventions pertain, and have discovered the mode of

securing better results either in more work or doing this more efficiently and economically. All invention may be traced to single-handed intermittent individual enterprise. Such are the facilities of bringing inventions forward, that the world is wisely disposed to judge the merits of inventions by the extent of their acceptance.

The following are the working details of the approved scheme for a Parcels Post shortly to be carried out in Great Britain. We give the money charges in American coin.

Weight.					Rate of Postage.
For a parcel not exceeding 1 lb.					6 cents.
"	exceeding 1 lb.	and not exceeding	3 lbs.		12 "
"	" 3 lbs.	"	5 lbs.		18 "
"	" 5 lbs.	"	7 lbs.		25 "

The remuneration of the railway companies for the conveyance of such parcels is fixed at eleven-twentieths of the gross receipts which the Post Office obtains for them, and if at any time the foregoing rates are altered, the companies may require a revision of their rate of remuneration. For some time to come the postal service as regards parcels will be one of certainty rather than great speed—that is to say, parcels will not travel with the same speed as letters; though it is stipulated that the the railway companies are to convey parcels by any train for which they are tendered, provided that the punctual working of their mail and express trains is not affected. We notice that one effect of the new Parcels Post system has been to lead the various British railway companies to announce important reductions in their rates for the carriage of parcels by passenger trains. The same result as to charges of express companies would doubtless result from a similarly accomodating system here; our Post Office provides nothing like the same facillities as those to be furnished in Great Britain.

At a meeting of the Royal Scottish Society of Arts, held on the 31st, ult., in Edinburgh, Mr. Benjamin Aiken, foreman smith, read a paper on "The Welding of Cast Steel." The ordinary method, he remarked, of welding cast steel was to heat it a very little more than blood red; if heated much above that it would break off or crumble away, and thus become useless. In welding cast steel they must have some flux that would have an amelior ating influence on the steel, and allow it to be heated up to a welding heat. and at the same time retain its form and quality. After alluding to various compositions used for that purpose, including Drake's, which was sold at some $7 per cwt., he said it had been discovered that stucco, which sold at 85 cents per cwt., answered the purpose admirably. In using it they must be careful not to let the steel be too highly heated before applying the stucco, and always be careful to form the flux as early as possible. He had found that by this method steel not only retained, but in many instances improved, its quality. We will be glad if some of our subscribers will try this method and report on it.

There has been general improvement in trade all round. The manufactured iron trade has been very firm on the whole, and it will take many months to execute the orders taken by some of the largest firms. Machine works are fully employed, and the demand is greater both for machinery and all descriptions of construction iron. Prices of iron have strengthened owing to the prospect of the great strike being about to end. The crop reports being decidedly favorable impart a stimulus to business; the general excellence of the European crops assures low home rates of grain. Cotton has declined still further, partly because of the collapse of the rebellion in Egypt, and from the fact of the weather lately proving favorable to the plant. Great activity in provisions has resulted from the sharp decline in prices, and an improved demand for export has caused some recovery in value. Petroleum has advanced, with large transactions in refined for export, as well as certificates on speculation. Heavy sales have been made of hops, with firm prices.

Among prominent topics in Cleveland is the discovery of iron ore in the Fifteenth ward. The owners of the locality are sinking deeper shafts. It is affirmed that analytical tests show a percentage of 40 per cent. of iron. Quantity as well as quality is an element of calculation not yet determined. Should a large supply be obtainable an important impulse would be given to the iron industries in this city.

We understand that 15,000,000 pounds of Lake copper have been lately sold for future delivery at 18 cents. The Lake companies have struggled persistently to maintain a higher rate, but this sale would appear, whatever nominal quotations, to determine the actual selling rate for wholesale lots.

MANUFACTURES.

TO MACHINISTS, MANUFACTURERS AND OTHERS.

The publishers of THE TRADE REVIEW solicit items of information concerning manufacturing and other establishments in any part of the country, and all such items will be promptly inserted in these columns, free of charge. Facts are the only things needed; and all communications should be accompanied with the name of the contributor—not for publication—but as a guarantee of good faith.

Manufacturers, machinist and engineers are particularly requested to communicate any matters of interest relating to their specialties. No one need be deterred from sending any interesting facts in his own language, as all such contributions will be properly revised before sending to press.

OHIO INDUSTRIES.

CLEVELAND.

The National Machinery Company, makers of bolt and nut machines, have so extended their business that the large works they have occupied for several years in this city are insufficient for the machinery and corps of artizans required to cope with orders. Accordingly they are about having erected at Tiffin capacious workshops, the ground secured admitting of future extension. We understand that several liberal offers have been made them to locate elsewhere, but the railway facilities of Tiffin, and the liberality of its citizens, financially and otherwise, have led them to accord it the preference. Consequent on this decision the large stock of new and second-hand iron and wood-working machinery on the premises, Superior and Bond streets, is to be disposed of, affording a rare opportunity to users of tools in these lines.

The Cleveland Non-Conducting Co., manufacturers and dealers in asbestos, hair felt cement and other pipe coverings, have been established in this city about five years, and from the first their business has been a growing one. They have, amongst other undertakings, done the work in their line for the Perkins block, Hotel Lincoln, the N. Y. P. & O. R. R. Co., the Akron Iron Co., and the Cleveland Rolling Mill Co.

The Worswick Manufacturing Co., steam fitters, machinists, brass founders, are employing all the help they have room for. They feel assured of a long run of orders putting to account the full capacity of their works. The Worswick patent radiators are coming into increasingly extensive use. Mr. J. R. Worswick is President, Mr. E. Lewis Vice President, and Mr. Jno. A. Prindle Secretary and Treasurer.

The new rod mill owned by the Cleveland Rolling Mill Co., lately made in one day 73,000 pounds of rods. This is the best yield ever made by any mill in the United States in the same time, the greatest weight turned out by any of them being 69,000 pounds.

The works of the Excelsior Iron and Brass Co., Forest street, between Garden and Cedar streets, are fast approaching completion. They will be engaged in the manufacture of switch and car locks, water-meters, model and experimental machinery, brass castings, &c.

The new furnace, one of the finest in the country, of the Cleveland Rolling Mill Co., located on the flats, is turning out 150 tons per day.

The new pottery of Patterson, Russel & Co., at Wellsville, has commenced operations. The buildings, solidly constructed of brick, are ample and commodious and fully equipped for a first-class pottery. The main building is 93x32 feet in dimensions and two stories high. Biscuit-kiln and greenhouse, one story high and also 93x32 feet. The biscuit and glost kiln and warehouse building is 60x32 feet and two stories high. From 35 to 40 men are employed. They manufacture yellow and Rockingham ware.

The new iron company recently organized to erect a rolling mill and nail works at Lagrange, has elected the following officers: President, David Spaulding, Directors, Thomas B. Taylor and T. J. Holliday, of Steubenville; Theopholis Pugh and Squire Murnes, of Wheeling, W. Va.; S. Clone, of Bellaire. The mill, the erection of which will promptly be commenced, will contain 60 nail machines. The capital stock is $300,000.

The new buildings for the Champion Harvesting Machine Works, Springfield, are going up rapidly, and the plant will be one of the finest in the country. Their buildings, lumber yard and railway sidings, cover over one hundred acres of land. The main building is 615x55, four stories and basement, with five three-story wings 1000x55, exclusive of a five story building for steel works, and their new rolling mills now being built 900x70 feet.

Peter Gerlach & Co., of Cleveland, are making a large machine for sawing sugar hogshead staves for a St. Louis party. The cylinder saw is 36 inches in diameter, and 58 inches long. It is made of steel, and revolves at the rate of 1200 revolutions per minute. The capacity of the machine is from 4,000 to 5,000 staves per day, and saves 30 per cent. of the timber formerly used, and 25 per cent. of the labor.

The new building of the Mills Tool Works, at Hamilton, is 140x40 feet. Their main shop is 400 x80 feet. The works employed 300 men, including a night force, for the last two years, and manufacture machine tools, boring machines and radial presses. They have orders ahead for one year, and foreign orders are constantly arriving.

The Standard Iron Co., Bridgeport, are fast completing their new mill. This company was organized with $200,000 capital. There will be two trains of rolls for turning out sheet iron, and eight boiling furnaces. The whole establishment is expected to be in running order by Nov. 1st.

At Springfield, a concern during the last year have manufactured 3,000 lawn mowers, 30,000 force pumps, 50,000 feet of iron fencing, and 3,000 of their iron turbine wind engines. This is double the amount of business of previous years, and includes a large foreign trade.

The Barney & Smith Manufacturing Co., Dayton, are actively engaged in the construction of passenger and freight cars, from three to four months' orders, from old contracts, having yet to be filled. They have just received a new steam hammer, and are employing 1200 men.

The new mill of the Ward Iron Co., at New Philadelphia, will contain 20 single puddling furnaces, one muck and two sheet trains and an 8 inch mill, with the necessary heating furnaces. They hope to start the muck mill by November, and the sheet mills by December at least.

The Victor turbine is in successful operation in many foreign countries and its fame is spreading. The makers, Stilwell & Bierce Manufacturing Co., Dayton, have just shipped wheels to England, France, New Zealand and other foreign countries.

At Dayton, the Barney & Smith Co. have recently put in a new large steam hammer, and are running with 1200 hands on orders that are from four to six months ahead.

The Ohio Central Coal Co., a coal mining corporation whose stock is owned by the Ohio Central Railroad Co., is about purchasing $70,000 worth of additional coal lands near Corning, O.

Etna Charcoal Furnace was blown in the first part of last week. They expect, with the new hearth and other improvements, to increase their daily output to about 12 tons.

The Youngstown Car Works are filling a number of orders for freight cars, each having a capacity of 25 tons. They have the appearance of a warehouse on wheels.

THE Vulcan Iron Works, Toledo, are building a new boiler shop 100x80 feet, which they will fit up with improved machinery, including a power riveter.

A RAIL mill will be erected at La Grange as soon as possible. The stock, which has been placed at $300,000, is largely subscribed for.

THE Ironton Manufacturing Co. are crowded to their utmost capacity, and have orders ahead for wheelbarrows for three months.

THE Witman Stove Company, at Ironton, turned out 157 stoves last week. The addition to their moulding room is now completed.

THE addition to the foundry of Witman Stove Co, Ironton, is being rapidly pushed to completion.

COOK & STEMPLE, Youngstown, are furnishing 350,000 brick for the new steel casting works.

MEANS, KYLE & Co., Ironton, are putting down the foundations for their Whitwell ovens.

THE Mahoning Powder Works, Youngstown, went into operation last Monday.

THE Buckhorn furnace, Ironton, is running on warm blast car wheels.

INDUSTRIES IN GENERAL.

MASSACHUSETTS.

THE main structure of the Worcester Wire Co., South Worcester, now presents an unbroken brick front three stories high and 500 feet in length, besides an extensive brick building in the rear for their annealing department. The works cover about 175,000 square feet of land, adjoining the Providence and Worcester Railroad. The company daily manufacture about twenty tons of wire of all sizes. Their new machinery includes, besides the new 300 horse power Greene steam engine from the Providence Steam Engine Company, and three steel boilers put in last fall, a new duplex pump, for forcing water against pressure, which has just been introduced. It will be used to make power for the hydraulic cranes to be used in the annealing house.

THE Chauncey Rubber Co. will erect at Reading a factory 100 feet in length.

THE Springfield Glue and Emery Wheel Co., Springfield, have again increased their capacity by securing a room 90x30 feet, which they have fitted with new machinery for the manufacture of a new automatic knife grinder for grinding long knives used in planing machines, paper machines, leather splitting, etc.

THE Henry Seymour Cutlery Co., Holyoke, say that their trade has increased 40 per cent during the past six months. The company employ 75 hands, with a product of 2,400 to 2,600 dozen shears and scissors a month. The company has recently shipped 500 pairs of their large tailors' shears to the London, Manchester and Glasgow markets; also a large invoice of trimmers to Chili and other South American States.

A NEW industry at Holyoke is the manufacture of imitation sealskin. The men who are to start the business come from England. They expect to invest about $1,000,000 and will employ 100 skilled hands whom they bring with them. The machinery is now on the way from Europe, and the manufactory will be in running order in November.

NEW HAMPSHIRE.

A BESSEMER plant and rolling mill is projected at Franconia, to convert steel direct from the ore.

CONNECTICUT.

THE Hartford Machine Screw Company have recently added four very heavy machines for producing screws from iron two inches in diameter. The machines have a capacity of making screws seven inches long.

DWIGHT SLATE, fine machinists' tools, Hartford, has continual orders for his patent cutting-off tools, and for his screw machines for shaving and slotting the heads of wood screws. He has 60 machines in the works, all ordered.

J. H. SHAW, Meriden, drop forgings and fine smithy work, is very busy on recent orders. He is making 2,000 hubs for bicycles.

NEW YORK.

THE New York and Flushing Building Company, at Flushing, manufacture portable houses under patents controlled by them. The houses are first erected at the factory, each piece being marked in position so as to identify it when the building is put up at its destination.

OUR Buffalo correspondent writes: The Buffalo Portable Forge Co., are doing a heavy business in their forges and hand and power blowers. On an average 125 hands are employed. Among the many points of excellence in their forge are strength, lightness, durability, workman-like manner of construction, powerful blast, and the ease with which the same is operated by means of the swivel handle arrangement in connection with the ratchet and gear combination, which is the easiest method of operating blowers in forges yet invented. Their blowers are of much the same construction. In these the fly-wheel makes many revolutions by one single pressure of the handle, which keeps the fan in motion without fatigue, and gives plenty of time between the successive strokes, to handle the iron operated upon without abating the blast.

THE Talhurst machine shops, Troy, are manufacturing 500 sets seaming tongs for roofers.

THE Cohoes Iron Foundry and Machine Co., at Cohoes, report an increase of business this year over any previous one, specially in mill elevators, slashers, and loose-boss rolls.

PENNSYLVANIA.

A LARGE manufactory for making compressee paper wheels for railroad purposes will shortly bd built in Philadelphia. Prominent railway men comprise the company.

THE Corry City Iron Works, are putting up a new machine shop, 60x40 feet, two stories in height, which will nearly double their capacity in their engine and boiler department.

THE Main Belting Co., Philadelphia, have added to their works a quantity of new machinery. The Leviathan cotton beltnig is now being used in a number of large concerns throughout the country.

The Pennsylvania Steel Co. employ 2,000 hands at their works near Harrisburg, and pay $80,000 a month in wages. The present rail capacity of the works is 100,000 per year, which will be increased one-third.

THE Nickel-Bronze Smelting Co., McKeesport, will rebuild its works on an enlarged scale.

THE Republic Iron Works Co., Pittsburgh, who have purchased the Wharton mill, are now remodelling the same, putting in new machinery and making important additions, which we will mention hereafter. They will manufacture, when they start, pipe and boiler tube iron, and will give employment to 250 men.

THE Bellefonte Iron Works, Bellefonte, are about to add 25 more nail machines to their nail making department.

THE Mirrick & Brittan Hardware Manufacturing Co., has recently been chartered; capital, $100,000.

THE steel furnace at Chester has a capacity of 500 tons ingots per week.

THE Phœnix Iron Co. have started their new mechanical works.

MARYLAND.

THE rolling mill at Naomi, on the Wilmington & Northern railroad, Md., is being enlarged by the addition of a puddling mill 158x66 feet. The machinery has been ordered. The mill will be supplied with a four-ton steam-hammer now being built at Alliance, Ohio. There will be five furnaces and about 50 hands will be employed. It is expected that the new mill will go into operation about the first of January.

VIRGINIA.

THE new Potomac Manufacturing Co., of Alexandria, Va., will soon be manufacturing steel car wheels and car axles; they will also have at work. a rolling mill for steel plates.

WISCONSIN.

THE Chicago, Milwaukee & St. Paul Railway Co is about to erect at Milwaukee, a building eighty feet wide and 400 feet long, to be devoted to the manufacture of car wheels, and from it, when once in full operation, there will be turned out 150 wheels daily, or an annual product of 20,000,000 pounds of castings.

ILLINOIS.

THE Harrison Steel Co.'s proposed works at Harrison, Jackson county, will have three 10-gross ton Bessemer steel converters, especially arranged for the basic process; a double mill, with a set of 40-inch three-high rolls, to make heavy merchant bars and blooms; a 36-inch 2-high blooming mill, to make blooms, slabs and billets; a billet mill with 20-inch train; a plate mill, with rolls 30 in.x 108in.; a 14-inch merchant mill; a "universal" mill, with rolls 24in.x48in.; a 14-inch hoop mill; two rod mills; two 10-gross ton Siemens open-hearth steel furnaces, and 20 Siemens heating furnaces.

THE plans for the further extension of the Deering Harvester Works, Chicago, have been perfected and the buildings, which are to be built at once on to the north end ofthe works, will be devoted to storage, shipping, and paint shop.

THE *Industrial World* states that the Chicago Polished Steel Shafting Co., recently incorporated with a capital of $60,000, for the manufacture of polished steel shafting, has purchased five acres of ground at Cummings and is erecting thereon a building 60x100 feet

THE Suspension Car-Truck Manufacturing Co., of New York City, has purchased a tract of twenty acres just north of the Pullman car-shops, near Chicago, and will proceed at once to erect large works.

IOWA.

AN extension to the shops of the Novelty Iron Works of Dubuque, has just been completed, giving a floor surface of 46,000 square feet, largely increasing the already large capacity of the works.

MISSOURI.

THE Groom Shovel Works Co., St. Louis, is erecting new buildings, which, with the new battery of boilers and 120 horse power Corliss engine, will have a capacity of 160 dozen shovels per day.

THE Duggan-Parker Hardware Manufacturing Co., St. Louis, are making improvements and putting in new machinery every week. They are increasing their working force as rapidly as hands can be obtained.

JOHN G. STUCKSTEDE & BRO.'s bell and brass foundry, St. Louis, is crowded with orders, among which are one from Wilmington, Del., for a 2,500 pound bell; one from Central City, Col., for an 1,800 pound church bell, and several from towns in Wisconsin for bells ranging in weight from 500 to 1,000 pounds.

TENNESSEE.

THE South Tredegar Iron Works, Chattanooga, has been successful in obtaining the contract to supply the New Orleans and North-Eastern railroad with spikes. Ten thousand five hundred kegs is the amount contracted for.

INSIDE WINDOW BLIND.

Robert Pisak.

CLEVELAND, O.

A patent was issued to Mr. Robert Pisak, of this city, on the 8th ult. for a novel and useful invention which consists in an improvement in Venetian window blinds. Its construction and operation renders it the most useful, simple and effective blind that has come before us. The ordinary slats covered with cloth or other flexible material are used, and are attached to tapes. The blinds are raised and lowered by means of cords that are secured to both ends of the lowest slat and pass through the others to pulleys that are attached on the inside of the window cornice; the cords passing over these pulleys are secured to a knob or hook on the window casing. When it is desirable to open or close the blinds one of the cords may be drawn which will set the slats at the desired incline. The blinds in being raised and lowered slide in recesses formed of iron. The upper portion is permanently secured to the window frames while the lower portion is attached to the upper portion by means of a hinge. This allows it to be moved out at any incline required; it is held in position by a folding arm that is secured to the casinig. At the top of the window-cornice is attached a lambrequin; on the inside and outside of which is secured an ornamental shield. The arrangement is devised to hide from view the blinds when drawn up.

A number of new silk manufacturing industries are talked of at Patterson, N. J.

REVIEWS.

Lectures on Evolution.—By Prof. T. H. Huxley (Illustrated) New York: J. Fitzgerald & Co., 30 Latayette Place.

This valuable work forms number 36 of the "Humboldt Library," a collection of works by the most eminent scientists of our time, such as Huxley, Spencer, Tyndall, Proctor, etc. They are printed from clear type, on good paper. The enterprise of bringing the best popular scientific literature within the reach of all is one that merits the hearty support of every one interested in the diffusion of useful knowledge. It is to be hoped that instructive volumes like these, in which the charms of literary style serve to render attractive the teachings of science, will in time have the effect of banishing from our homes much demoralizing trash which passes current as "literature."

Blackwood's Edinburgh Magazine. American Republication. New York: The Leonard Scott Publishing Co., 47 Barclay street.

This number contains a vivid sketch of the celebrated French actress, Rachel. "Birnham" is an account of Scotch railway experiences. Then follows an article on the false prophet of the Soudan, entitled "The Coming of the Mahdy," looked to by the Turks as a messiah, with a fine sketch of Mohammedan religious prejudices and aspirations. "A Career of the American Revolution," that of Lieut. Col. Patrick Ferguson is curious, instructive and interesting; the story "Ladies Lindores," is continued, and reaches an exciting point. Various articles render this number most attractive.

Westminster Review. American Republication. New York: The Leonard Scott Publishing Co.

This number has for subjects: "Canada as a Home," "Camille Desmoulins," "The Decay of Faith," "Darwin," "Kant's Moral Philosophy," "England's First Foothold in the East," Caroline Fox, John Sterling and John Stuart Mill, "Invention and Patent Law," "England and her Colonial Empire," and an extensive review of contemporary literature.

The Century, Illustrated Monthly Magazine for October. New York: The Century Co., Union Square.

This monthly has a plentitude of entertaining articles and illustrations the very enumeration of which would wet the appetite of readers. It contains a steel page engraving of Abraham Lincoln. "Life in a Mexican Street" is vividly portrayed. "The Corcoran Gallery of Art," views of "the Gibraltar of America,"—Quebec, a "Georgia Corn Shucking," the "Negotiations for the Obelisk," and "Handwork in Public Schools," are among the attractive illustrated articles. Stories, poems, communications, home and society topics, and the "World's Work" are included. With the November issue the twenty-fifth volume commences.

IMPROVED AVERAGING MACHINE.—Mr. Wm. S. Auchiocloss, an engineer of New York, has invented a most ingenious averaging machine. The method by which the weight of the platform is eliminated from the result of the weight of the machine was exhibited and explained. This is accomplished by counterweights sliding automatically in tubes, so that in any position the unloaded platform is always in equilibrium. Any combination of representative weights can then be placed on this plat form at the proper points of the scale. By then drawing the platform to its balancing point, the location of the center of gravity will at once be indicated on the scale by the pointer over the central trunnion. The weights may be arranged on a decimal system, with intermediate weights for closer working, or they may be made so as to express multiples or factors. Each machine is provided with a number of differing scales, divided suitably for various purposes. When the problem is one of time, the scale represents months and days; for problems of proportion, the zero of the scale is at the center of its length; for problems for the location of center of gravity of a system from a fixed point, the zero is at the extremity of the scale, etc. The machine has sixty-three transverse grooves, which, by arrangement of weights, can be made to serve the purpose of 252 grooves. It is twenty-nine inches in length, nine inches in width, and weighs about thirteen pounds. With the machine can be found average dates, as, for instance, of purchases and of payments extending over irregular periods; also average prices, as for "futures," in common use among cotton brokers; the problem of average haul, so often presented to the engineer, can be solved with ease and great celerity.

THE TECHNICAL DRAUGHTSMAN.—In engineering and contractors' establishments the technical draughtsman is frequently at the bottom of the welfare of the establishment, although often not recognized as such. Every one who has much experience in a workshop knows very well that often wood and iron are wasted (to say nothing of the time) in marking out work, from the absence of the knowledge of practical geometry amongst the workmen. Some commonplace workman gets hold of a drawing and proceeds to mark out some piece of work; he neglects his center lines, works on no definite principle, and when half finished, he discovers that the work won't come in—in fact, what has been done is completely wasted. A workshop where the master has worked his way up without a knowledge of scientific principles is frequently the place where the above kind of thing most frequently occurs. He keeps no draughtsman, but does his sketching with a lump of chalk, or the toe of his boot, not knowing that it is false economy to economize in the drawing office, or in fact in any technical department. We have heard it pithily observed that it is better and cheaper to waste paper than wood or iron.

RAILROADS.

At Portland, Oregon, an immense railroad depot is to be erected, to cost $1,500,000.

Superintendent Briggs, of the Valley Railway, has been appointed general manager of the Connotton.

A corps of engineers are surveying for the fourth time the proposed line of the Sciota Valley and Chesapeake and Ohio Railroad, in Logan county. The principal difficulty between Columbus and Fort Wayne is to get a low grade through that county, the fall from Bellefontaine, both east and west, being very rapid.

The largest tunnel in the world is that of St. Gothard, on the line of railroad between Lucerne and Milan. The summit of the tunnel is 990 feet below the surface at Audermatt, and 6,600 feet beneath the peak of Kastelhorn, of the St. Gothard group. The tunnel is 26½ feet wide, and 10 feet 10 inches from the floor to the crown of the arched roof. It is 9½ miles long, 1⅝ miles longer than the Mt. Cenis tunnel.

The Columbus, Hocking Valley & Toledo is one the few roads that has continued to show an increase of earnings without a change of mileage, a fact largely explained by its immense coal traffic from the Hocking Valley mines.

A line is to be constructed from Wheeling to Cincinnati to be called the Wheeling & Cincinnati Mineral Railroad. It will pass through Barnesville, Chillicothe, Hillsboro and other towns in Ohio. This line would answer for a direct western connection of the Vanderbilt Southern Pennsylvania road, which is designed to cross the mountains, strike into the coke country and get to the Reading by way of Harrisburg.

The New York, Erie & Western Railroad Co. is making every effort to improve its equipment and add to the comfort of the traveling public. A change from soft to hard coal will soon take place, making cinders a rarity. Within the past few months 25 first class passenger coaches have been added to the rolling stock, 20 of which were built by the Pullman Co. and five by Jackson, Sharpe & Co. The road is also to have 7,000 new freight cars, 5,000 of which have been delivered.

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TO KEEP BELTS SOFT AND PLIABLE.—Care should be taken that belts are kept soft and pliable. The question is often asked: "What is best for this purpose?" We advise, when the belt is pliable, and only dry and husky, the application of blood warm tallow; this applied, and dried in by heat of fire or sun, will tend to keep the leather in good working condition; the oil of the tallow passes into the fiber of the leather, serving to soften it, and the stearine is left on the outside to fill the pores and leave a smooth surface.

Solderless Standing Seam Expanding Water Conductor.

We feel we do a general service in directing attention to the Standing-Seam Water Conductor, manufactured under the Irwin & Reber Patent, by the Solderless Standing Seam Conductor Co., Limited, of Allegheny, Pa., as providing against evils that would appear chronic with all other forms of water pipes. The yearly amount of money expended on pipes burst by water freezing in them, with the incidental damage superadded, would, could it be calculated, be found to represent an almost incredibly large sum, all of which could be saved by the use of this company's conductor, which makes allowance for the expansion of freezing water and absolutely prevents bursting. One great feature in its construction is that it is made double locked, allowing opening for expansion and yet remaining perfectly water tight. We may here remark that a prominent weakness in other water-pipes is in their numerous cross seams, whereas this conductor is made in six foot lengths without any cross seam whatever. In addition to the advantage of making allowance for expansion in the case of water freezing in the pipe, the Standing Seam furnishes a secure hold for the fastener, so avoiding any necessity for placing the conductor close to the wall of a house, thus keeping the wall dry in case of an overflow from the eave pipe or head. It is made double locked, allowing opening for expansion and yet remaining perfectly water tight. The conductor is made of the best bloom cold rolled iron, galvanized, and of IX charcoal tin plate. It is important to note that no solder is needed to attach the secret fastener to the conductor, a fastener superior to any in the market, as it is driven into the wall or mortar, nothing is exposed but the head. The wedge which attaches the conductor to the fastener proper is easily inserted and made tight without interference with expansion of the conductor. Any mechanic can make the conductor perfectly secure to the wall. Architects of eminence who have introduced the conductor into their buildings and watched its operations through a series of winters furnish recommendations embodied in the new illustrated price list of the company, testifying to its combining security, expansion, durability, and cheapness of construction. Many of these say in substance that they regard it as the best conductor that has ever come under their notice and engage to use it in all of their buildings in preference to all other iron and tin any conductors. Its highest claim may be summarized in its allowing expansion without fracture, but its handsome appearance, it being octagonal in form, is worth nothing. Wherever this conductor has been entered for competition with any other conductor pipe, it has won first premium by concurrence of all the judges. Two instances that may be cited are Pennsylvania State Agricultural Society Exposition, September, 1881, and the Massachusetts Mechanics' Association Exhibition, September, 1881. The company makes cold rolled copper and other sheet metal conductors to order. Its office is at No. 47 Federal street, Allegheny, Pa.

Good Castings From Common Pig.

G. Ahlemeyer describes in *Glaser's Annalen* a new system of melting iron, and at the same time incorporating it in scrap, wrought iron, etc. The cupola is supplied with blast through two sets of tuyers, one above the other, there being eigheeen in each set. The tuyeres or ports, which have the form of a vertical slot, are directly connected with a circular tuyere ring. The particular feature of the cupola is, that the bottom is a slightly inverted arch which is pierced by two openings through which both blast, or rather imperfectly consumed gases of combustion, and the fluid iron can flow. It is a small chamber in which the iron collects. It is heated by the gases forced downward from the cupola above, which are supplied with the necessary air for combustion by a special tuyere leading from the main blast-pipe. This chamber at the same time serves for preheating scrap, etc., which need only be pushed into the bath for dissolving it. It is well known that considerable quantities of scrap can be used by directly changing in any ordinary cupola; but it is claimed that in this case there are economy of fuel and a greater facility in making sharp, strong castings and a purer metal. The best iron for this purpose is said to be inferior pig. To it from 40 to 50 per cent. of scrap, etc., may be added. The total consumption of fuel is stated to be 10 per cent. of the weight of the product.

ITEMS OF INTEREST.

THE new money order arrangement, by which postal orders are much cheaper than heretofore, it is believed, will work satisfactorily. Five dollars can be sent for only three cents, while for ten dollars the charge will be eight cents. Heretofore only $50 could be transmitted through the post-offices; now $100 can be forwarded. By the new plan peculiar postal cards are used, having printed figures. The postmaster giving the card punches the proper figures showing the amount to be paid.

THE cost of ships in England and the United States is gradually approximating. Passenger steamers that cost from $105 to $125 per ton, and cargo steamers from $80 to $95 per ton, in the United Kingdom, a year ago, now cost $15 and $20 per ton above those rates; and even at their advanced prices it has been difficult to get work delivered at an early date.

DYER & LIBBY, of Portland, have invented a fish-cleaning machine. The invention is a set of Russian bristle brushes set in a peculiar position and rotated by steam. With one of these simple machines the work of five hands in the old way is done in the same length of time, and done much better. About fifty mackerel per minute can be dressed by this machine.

THE rapid growth of the tin-plate trade is shown by the fact that the make in Great Britain increasd from 2,393,291 boxes in 1871, to 6,000,000 boxes in 1880. Of these products 75,372 tons, valued at $9,800,000, were shipped to the United States in 1870, while in 1880 this country bought from British makers 161,284 tons, costing over $16,800,000.

EDISON has constructed for the N. Y. College of Veterinary Surgeons, an electric lamp which makes a 500 candle power in an area of a half-dime. The electrodes or carbon points are only one-tenth of an inch in diameter, the object being to obtain the highest intensity within the smallest possible space. It requires a battery of about 40 cells.

IRON manufacturers of Pennsylvania complain of the scarcity of good hematite ores in the State. They state that the soil of Pennsylvania has been worked for the best of these ores until it now produces nothing but the leaner specimens, which do not pay. The best magnetic ores used in Pennsylvania now are brought from Spain and Africa.

A SUMMARY method of unloading coal boats by the Aire & Calder Navigation Company, at Goole, Scotland, is to hoist the coal boat weighing 30 tons, bodily out of the water with a hydraulic crane, and literally turn it over into a larger vessel, just as a coal hod is emptied on a fire.

LEAD baths in tempering mill picks have taken the place of everything else. The picks come out of the bath clear, and the temper can be well defined. Oil is also being used for cooling instead of water.

A RECENT investigation of the dirt banks at the collieries owned by the Philadelphia and Reading Coal and Iron Company showed that there were at least 60,000,000 tons of them. Of this at least 40,000,000 tons can be utilized for fuel.

DURING 1880 Europe produced 203,330 tons of zinc, of which nearly 99,000 tons came from Germany, and about two-thirds from Upper Silesia. Belgium contributed 65,010 tons, England 22,000, France 12715, and Austro-Hungary 3200.

MACHINES are now made which will cut from a roll of wire, pins of the right length, head them, point them, polish them, sort them out with their points all one way and stick them in the paper, or rolls, faster than one can count.

AT Havre it is proposed to have a pontoon structure at some distance from the land, on board of which public telephones will be placed for use by the shipping in communicating with the land.

ONE hundred thousand dollars was the sum required by the Wilson Sewing Machine Company to induce it to locate in Wallingford, Ct. The amount has been raised.

PAPER car wheels appear to grow steadily into favor on American railroads. During the first 10 months of 1881 one firm alone turned out 7,729 of these wheels.

ABOUT 200 letter balance scales are made daily at the Fairbanks' Scale Company's works The concern has a government order for 6,000 such scales.

PROF. S. W. ROBINSON, of the Ohio State University, in his recent work on Railroad Economies, estimates the cost of stopping a train at $1.77.

ONE hundred coke ovens, with a capacity of 125 tons of coke per day, will be built at Tioga, Pa., this fall.

POWERFUL magnetic properties have been developed in the water of an artesian well recently bored at Yankton, Dakota.

THE four Atlantic pine States, including the whole of Florida, contain less than twenty-four billion feet of pine.

ABOUT $12,214,000 has been placed in increasing the number of cotton spindles in the South during the years 1881-82.

THERE are 75 forges in the United States making nugget iron from iron ore.

MECHANICAL RECEIPTS AND ITEMS.

Varnish Deadening.

The cause of varnish looking dead as we call it, in some places, while in other places it seems almost as bright as the day it was finished, is something we have often puzzled over, and after much study and examination of some of the "mysteries of painting," we are inclined to think the rubbing of the filling has something to do with it. Now, sometimes when the body comes from the wood-worker, it is not as level as it should be; this does not apply to all bodies, nor does the question, as we think it is the exception rather than the rule. Now the painter is supposed to level all these places by the time the job is rubbed out of filling; the object of filling is to get a level surface, and on heavy jobs from four to six coats are necessary to obtain the desired results, and sometimes in addition to receiving three or four coats of lead, having to be glazed all over. Now in rubbing or leveling this filling, no matter how careful we may be, there will be some places that are rubbed through the filling, leaving nothing but the lead and priming, and perhaps only the priming to cover the wood, while on the same panel the guide coat may be nearly taken off, so that in some places we have quite a body of paint and in others none of any account. Now this is the case no matter how well regulated the shop may be or who rubs the filling. The job is given from the body maker to the painter to finish, and he must correct the faults of others even at the risk of spoiling his own work, and take the blame afterwards. These places that are rubbed so low, while the other parts have only the guide coat off, allows the varnish to be absorbed unevenly, no matter what anybody may say about paint absorbing varnish; this is our opinion, although we have no doubt there may be other reasons that some may advance. Varnish is something that we may learn more about every day; how the changes of the weather affect it, and such cases as the one referred to in the above question: the nature of varnish is susceptible to so many causes for its action, that it is almost impossible to give a direct answer to any of the tricks that varnish may perform.

Alloy for Small Articles.

This alloy melts at a low degree of temperature. Bismuth 6 parts, zinc 3 parts, and lead 13 parts. The three metals, after having been well melted and stirred together, should be poured into another melting pot and melted again. This alloy cools with remarkably clear cut edges, and if the articles made of it are dipped in diluted nitric acid, then rinsed in clear water, and polished with a woolen rag, the raised parts of the surface will have a fine polish, while the sunken parts will have a dark gray, antique appearance, which forms a pretty contrast. The proportions of the different metals, dividing the alloy into 100 parts, are: bismuth, 27.27, lead 50.09, zinc 13.64.

Welding Springs.

A correspondent of the *Blacksmith and Wheelwright* says: My plan for welding springs is to upset to about the original thickness. Make a neat short scarf and weld the same as two pieces of common iron. I never split or punch holes. I find I can get a far better job otherwise. If, by accident, I should not get a good job, and some part is inclined to scale up and not weld thoroughly, I take a small piece of rusty hoop-iron and insert under the scale and take a second heat. There is a good deal in having a good, clean, well-charred fire in work of this kind.

USEFUL RECEIPTS.

PLASTER OF PARIS MODELS.—It is said that plaster of Paris of hardness sufficient to be employed as a mold for metal may be made by using 10 per cent. of alum in the water which is intended to be mixed up with the plaster.

GOOD GROUND FOR PAINT ON BUILDINGS.—Before repainting a building apply a coat of crude petroleum with a fine whitewash brush, let it dry two or three weeks, then put on one coat of paint. A second painting is rendered unnecessary, and thus much money is saved.

BRONZE YELLOW ON IRON.—A very fine effect is produced on cast-iron by a mixture of petroleum with French yellow, the result being a fine bronze yellow, not liable to ordinary wear, and if applied hot, filling the pores of the metal, defying anything short of the file or planer tool to obliterate it.

TO PREVENT BRASS FROM TARNISHING.—Brass is best protected from tarnishing by coating it with a lacquer. This lacquer is generally composed of shellac dissolved in alcohol—shellac 1 ounce; alcohol ¾ pint. This lacquer is variously colored by tincture of turmeric, saffron, and dragon's blood.

ANTI-FRICTION COMPOSITION.—An anti-friction composition used with great success in Bavaria, instead of oil, tallow, etc., is thus made: 10½ parts of lard are melted with 2 parts of pulverized plumbago. The lard is melted, the plumbago mixed in slowly, stirred well, and the mixture applied cold.

TO IMITATE EBONY.—To imitate ebony, wash any compact wood with a boiling decoction of logwood three or four times, allowing it to dry between each application. Then wash it with a solution of acetate of iron, which is made by dissolving iron filings in vinegar. This stain is very black. and penetrates to a considerable depth into the wood, so that ordinary scratching or chipping does not show the original color of the wood. It is a mistake to mix the solutions of logwood and iron before applying them to the wood, as some receipts direct.

TO PREVENT SILVERWARE FROM TARNISHING.—Solid silverware, as well as plated goods grows dark and tarnished in a very short time when exposed to the air, and even when put away in a dark place. This is especially the case where hard coal is used in the house or neighborhood, as the sulphur in the coal, liberated by heat, is sure to stain all the silverware within reach. This annoying tarnishing can be entirely prevented by painting the silverware with a soft brush dipped in alcohol in which some collodion has been dissolved. The liquid dries immediately and forms a thin, transparent and absolutely invisible coating upon the silver, which completely protects it from all effects of the atmosphere, etc. It can be removed at any time by dipping the article in hot water.

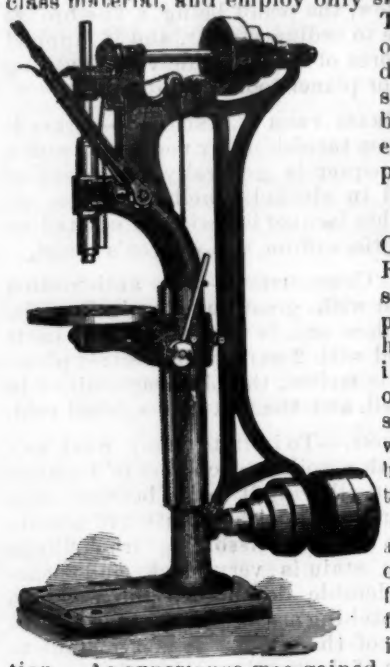
TO SECURE FINE POLISHING POWDER.—To secure fineness and uniformity no process equals that of elutriation, which is thus performed: Suppose it were necessary to separate the ordinary flour of emery into three different degrees of fineness. Take three vessels (such as tin pails or glass jars) and mix the emery with a large quantity of water—say a quart of water to 1½ ounces of emery. Stir the mixture until the emery is thoroughly diffused through the liquid, and allow to stand five minutes. By this time all the heavier particles will have settled, and on pouring the fluid into a second jar only the finer portion will be carried over. So continue to wash the first residuum until nearly all the particles have subsided at the end of five minutes, and the water is left comparatively clear. You will now have the coarse portion, No. 1, by itself.

AN OIL BATH FOR BLACK SILKS.—Achille Gillet gives, in the Teinturier Pratique, the following method for making this bath: Dissolve 2 kilos. of crystallized soda in 100 liters of tepid water, making an alkaline bath of 2deg. C. Stir in olive oil just sufficient to prevent its floating on the top of the bath, which resembles a soap bath covering to the oil. This bath may be strengthened by the addition of Marseilles white soap, whereupon the silk is dried without any washing. The silk is softened by the process. However, any alkaline bath will impart a whitish aspect to the black, which may be removed by passing the silk through a fresh cold bath of a weak solution of citric, tartaric, or acetic acid, which neutralizes the soba, either partially or totally, whilst fixing the oil in the silk.

Excelsior Machine Works.

CLEVELAND, O.

The Excelsior Machine Works, Hamilton street. Cleveland, were founded in 1880, by Messrs. F, Bruch & E. I. Leighton, and from the character of the work turned out and the facilities of the production possessed by the firm, promises to prove an important addition to our city industries. The firm manufacture all kinds of machinery, including iron bridge work, roofs, builders' rods, bolts, and anchors. A specialty consists in their 22 inch lever drill, 1,750 lbs. weight, which possesses many advantages in working, and may be applied to a wide range of work. It is durable, and is furnished with steel spindles. The firm use first-class material, and employ only skilled mechanics. They have five or six months' orders ahead, consisting of large bridges, roofing, etc. Send for prices.



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VELOCITY OF CUTTING TOOLS.—From the circumstance that man's past experience has been acquired in the treatment of wood and the softer metals which admit a higher velocity, the earlier attempts to bore and turn cast iron on a large scale failed, because the force was applied in a wrong condition. As experience was gained, it became apparent that a much slower velocity combined with great pressure was necessary, which entirely overcome the difficulty. The range of velocity found most suitable for different substances lies rather wide. Cast iron requires a slower motion than wrought iron, and may be said to range between twelve to twenty feet per minute, according to hardness. Sandstones, from their structure, require a slower motion in the planing machine when being shaped into blocks or columns, and a slower motion still is found necessary by granite turners, where the action is detrusion and the edge of the detruding instrument or disc moves in unison with the granite column. Going in the other direction, the limit of speed has scarcely been reached. A velocity of 8,500 revolutions per minute is employed in the fine cutting of wood; and even then high speed is not found to heat the instrument to a degree which would necessitate discontinuance of the operation. It is different when the piece of wood itself is driven at that high speed, as in the case of wood turning, because from the friction exerted on one point only, the temper would be taken out of the cutting instrument. This remarkable difference arises from the swift revolution of the cutting instrument, where two new conditions are found to step in. The first is that due to the extent of the cutting points. When each acts in turn, they give a momentary rest to all the other points. Secondly, the instrument whirling at such a high velocity is in the position of a blowing fan, and is thereby kept cool by the presence of the atmosphere.

FOREIGN CORRESPONDENCE.

ENGLAND.

WOLVERHAMPTON, September 8.

The event of the hour in the iron trade is the prospective collapse on the 30th inst., of the Northern smelters' alliance for restricting the production of pig iron. By far the greatest increase in values and decrease in stocks has occurred in the Cleveland district; and if this has been brought about by the restrictive policy, the Cleveland iron masters will make special efforts to induce the Scotch smelters to continue the arrangement. It is a moral certainty that at this time last year, notwithstanding low values, some firms both in Cleveland and Scotland were making a profit, and it is equally certain that others were making a loss. If values had not been artificially raised by the restrictive combination, the consumption would have been greater at home, and the iron of both districts would have been shipped to foreign markets in much larger quantities. The Scotch iron masters have seen through the unhealthy nature of restrictive combinations, and they have recognized "competition" rather than "combination," a true maxim in trade. Some of the iron manufacturers now complain of slackness of demand especially in the bar trade, and do not see any hope of increasing their prices, even should pig iron rise higher. The hematite market is firm. The demand on American account especially is very good, and large deliveries have left and are leaving the several ports of England for the States. 59s. is the average price quoted for mixed numbers of Bessemer iron. Large metal consignments are being prepared for shipment at an early date. The mills and forges throughout the country continue well employed, few of the manufacturers complaining of any scarcity of orders, but the low and unremunerative nature of prices is generally spoken of. Continental competition is not so keen in some branches, as the works are full of orders, but the productive power of British works is so great, that something more than the existing demand is needed to enable makers to advance quotations. The "fall" trade is still looked for with confidence, although the weather of the last few weeks has interfered somewhat with harvesting operations and prospects. Sheet iron continues the most active branch of the trade, but there is a good demand for bar iron of both best and common qualities. Hoop makers are turning out more work, while strips, nail rods, channel and girder iron are in good request. The steel rail trade, which has been rather unsettled lately, shows a rather firmer tendency. Sheet plates are being turned out in large quantities by the Siemens' process, while for blooms and billets there is a steadily-increasing demand for home consumption.

PRACTICAL MECHANICS.

Castings Rent or Sprung.

It is seldom that a green-sand casting is cracked, in fact we may say that we have never known such a case. Dry-sand castings, on the other hand, sometimes crack, and loam castings often. A rent-casting may be caused by, and arises principally from three things; first, its formation; second, the metal; and third, the manner in which the mould has been built. With the formation or shape of the casting the moulder has nothing to do; but he has to do with the metal and his mould. He knows that his casting must contract in cooling, and if the mould is built strongly and is incapable of yielding to the contraction of the metal, the metal (or casting) must yield to the mould; one of the two must give way. In order, then, to allow the mould to yield, the core-irons ought to have a large amount of clearance from the casting, especially when it is large. We have spoken of an inch-and-a-half of clearance space, but that should only be in small castings; in large ones the clearance should be nothing less than two-and-a-half inches. Again, bricks made of dried loam should be freely used in making the cores where the contraction is great. It is sometimes requisite to build all the cores entirely of loam brick, and to put the same material in many parts of the outside of the mould, such as between brackets, flanges, snugs, etc. Any castings of an inch in thickness, and of good metal, should be quite capable of overcoming the resistance of a mould built with plenty of loam bricks, and with ample clearance in the core-irons.

We may here mention another preventive; the top of a casting should be a quarter-of-an-inch thicker than the sides, either in dry-sand or loam, the reason being that the metal on the top is not quite so strong and sound as in any other part of the casting, and two causes are at work preventing this from being the case; first, there is less pressure on the top than anywhere else; second, the dust and particles of blacking and loam float to the surface mould, and become incorporated with the metal, causing it to be weak. For instance, if we cast an open plate on a bed of sand, say twelve feet by six feet, and two inches thick, and during the time of casting an irruption takes place from some cause, and the metal will not lie at peace—it dances and bubbles as long as it has life—the face of the plate is extensively scabbed—the sand has left its bed to the depth of half an inch, possibly more in some places. In nine cases out of ten, when the plate has cooled it will be found to be cracked in the center; an extensive rent of about four feet may be seen there, the outside remaining quite sound. The cause of this is easily seen—the sand in the center of the mould has mixed freely with the metal, preventing the cohesive metals from coming together, and in cooling a portion of it parts from the rest. It is customary for smiths who are about to weld two pieces of iron together to throw sand into the fire when the iron is nearly at welding heat; this is done simply for the purpose of causing the silica or cinder to run off the piece of iron about to be joined to another. The smith takes care that no sand is left on his iron, else an imperfect weld is the result. So it is with the plate of cast-iron on the bed, and also with the top of a casting in which there is a large surface. Again, the top of a casting cools much sooner than the sides or bottom parts, and this of itself calls for the top of all loam castings being made thicker than the sides or bottom parts.

SCIENCE AND INVENTION.

IMPROVEMENT IN SHOVELS.—An improvement in shovels has been patented by Mr. Robert T. Pettibone, of Wyoming, Pa. The back strap is shaped to fit the sides of the socket formed in the blade for the handle, so that the middle part of the strap forms the back of the socket, while the edges are bent backward, as straight flanges, which being riveted to the sides of the handle socket, leaves the back strap flush, or nearly so, with the blade.

EQUALIZING DRIVING POWER OF COILED SPRING.—A patent lately taken out for a regulating wheel, driven by the coiled spring has a spiral row of perforations on its face from near its center to its periphery. A spur wheel, whose teeth engage with the spiral perforations, slides upon a feather upon its shaft, and the outer end of the shaft is provided with a gear wheel which engages with a train of wheels, through which the power is applied to the machine to be driven, with a gradually increasing leverage as the force of the uncoiling spring decreases.

INSTANTANEOUS FORMATION OF STEAM.—Messrs. Serpollet, Freres & Co., of Paris, have patented an invention for the instantaneous formation of steam, which permits of its use at once in the cylinder of the engine. A pump sends the required quantity of liquid between two plate surfaces, which are heated, and between which there is only a capillary space. The liquid spreading in a thin layer evaporates at once, without going into the so-called spheroidal state, and this steam acts in the cylinder as fresh formed steam. The speed of the pump is regulated by the engine, the pump being connected with the shaft of the engine.

ROCK DRILLING MACHINES,—Improvements in rock drilling machines have recently been patented by Mr. Joseph L. McClughen, of Ozark, Mo. The feet of the machine are provided with rollers that can be swung under them to move the machine. The drill carrying frame is pivoted to an upright standard on a base frame, and can be turned to set the drill at any desired angle, and is held in position by a spring catch and segmental rack bar. The drill is raised and lowered by means of a crank and worm gear. In operation when the crank shaft is rotated, a tappet raises the drill frame, which, after the tappet passes, is forced down by a spring, thus giving a rapid reciprocating motion to the drill, which is also turned as it reciprocates. A coil spring raises the drill off the rock when it strikes, and prevents the drill bit from catching in the sides of the cavity made by it.

STEAM WHEEL.—A new kind of steam engine has been recently patented in Austria by Professor Wellner, of Brunn. The so-called "steam-wheel" consists of a simple water wheel, mostly immersed in hot water in a closed vessel. Steam is admitted at the lower part, and forces the cells of the wheels upward, producing rotation. The steam fills more and more of the cells on the rising side, and at length begins to escape into the steam space above the water. Steam may either be produced directly at the lower part, or conducted to the vessel from elsewhere. The upper tube for outlet of steam may lead either into the open air or into a condenser. The mechanical work consists in the ascent of the specifically lighter steam in the heavier liquid. These steam wheels may either be used as independent motors or in connection with ordinary steam engines; in the latter case the escape steam of one kind of machine may be utilized for the other.

UNITED STATES ORGAN COMPANY.

Whitney & Raymond.

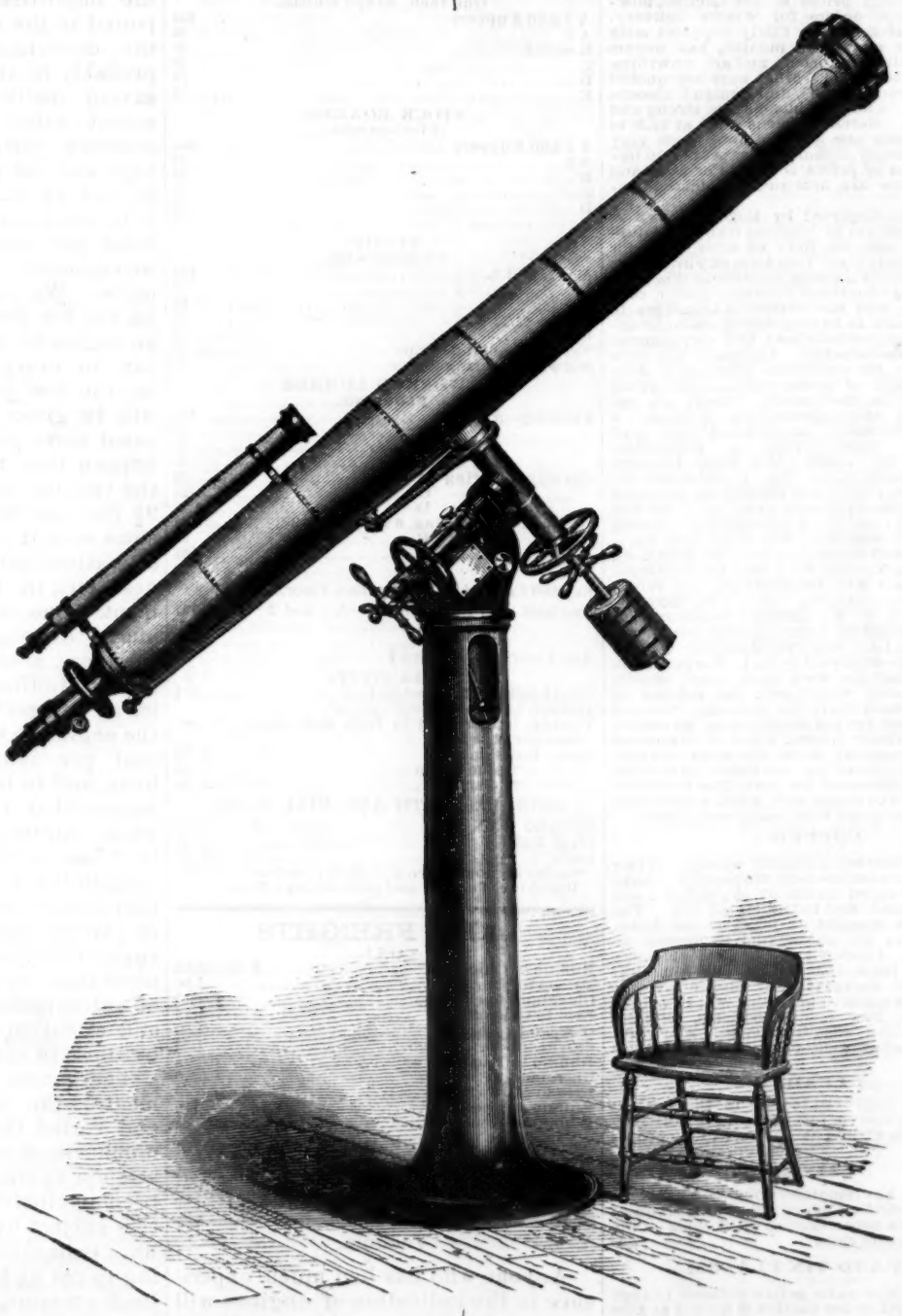
CLEVELAND, O.

One of the most gratifying visits we have paid to Cleveland's industrial establishments was to Messrs. Whitney & Raymond's United States Organ factory near Euclid Avenue Station. The struction is new, of brick and granite, and presents

an imposing appearance. The machinery is of the latest improved patterns. The entire establishment is designed to afford the proprietors and employes the greatest convenience as regards health and labor. The several features of the U. S. organs here made and the details of their construction were pointed out. These organs have the following new patent devices which contribute to the favor extended to them: new patent sliding cover which is hung so admirably that it never binds, and is opened with scarcely appreciable effort; a new music receptacle which does away with having the music mislaid or torn; the swinging lamp stands which enables one to place the lamp just where it is wanted; also an elegant device for rendering the instrument proof against those troublesome pests, mice. Passing through the different departments of the establishment we found order and neatness prevailing everywhere—two leading essentials to success. The sales room is on the ground floor, easy of access; on account of its spaciousness it affords the opportunity of testing the powers and delicate effects of the instruments. On this floor we were shown, first the action room, and secondly the fly finishing room. Below these rooms are the engine rooms, with everything bright and glistening, from the oil cup to balance wheel. The tuning department, which is an interesting one, has for its head Mr. C. H. Dickinson, the tuners are skilled in the highest degree. The engineer of the works is Mr. Watson, an able mechanic. The proprietors are about to introduce a new departure in the style of organ cases, manufacturing cases which will resemble those of upright pianos. The United States Organs are handled in Boston by the celebrated musician, Dr. E. Tourjee, who is director of the Conservatory of Music, which is sufficient recommendation in itself as regards the position the company holds in the American market.

Warner & Swasey's Equatorial Telescope.

The above cut represents the great equatorial or astronomical telescope just completed by Messrs. Warner & Swasey, of our city, for the observatory of Beloit College. The equatorial movement is that best adapted for following a celestial object, with but one motion. The stand is constructed with an axis which points to the pole of the heavens, and carries, at right angles, another axis; to this the telescope is fastened at one end, and at the other is a counterpoise. The first is revolved in an opposite direction to that in which the earth rotates, either by the hand or an endless screw. To this screw motion is imparted by a very ingeniously constructed clock, with a compensating conical pendulum, which has been greatly modified and improved by Messrs. Warner & Swasey. Too much credit cannot be given these gentlemen for the very great improvement they have made on this conical pendulum for equatorial stands. The second axis serves to elevate the telescope to any point above or below the equator. When the object to be observed is in the field the axis is clamped. The two axes give two movements, the first in right ascension, the second in declination. The polar axis of this stand is adjustable, which is a very necessary matter, making it universal in its usefulness, as it can be adjusted readily to any latitude or Azimuth. Different methods are used in mounting equatorial stands, which makes them "fixed" or "portable." This is to be permanently fixed in the Beloit College observatory, Beloit, Wisconsin. For more accurate observation the two axes are provided with circles divided into degrees, and minutes, and furnished with verniers and reading microscopes, and by means of these the exact position of any celestial object at a given time can be registered, or on the other hand, the telescope may be directed at any time, day or night, to a celestial object with certainty, the correct time being ascertained and the position of the object obtained from astronomical tables. The object glass of this excellent instrument was made by Alvin Clark & Sons, of Cambridge, Mass., and is $9\frac{1}{2}$ inches clear aperture, focal length $11\frac{1}{2}$ feet. The instrument is provided with a number of celestial eye-pieces or negative oculars, giving powers ranging from 70 to 1000. The finder is a very desirable small telescope of itself, being provided with a Clark $3\frac{1}{8}$ object glass, 4 feet focal length capable of resolving clearly the companion of Polaris. Time and space will not permit us to go into all the details which would be required to describe the many improvements and every minute part which goes to help constitute this one of the finest mountings for an astronomical telescope the country affords. The entire mass, although weighing several hundred pounds, is so delicately poised that a child, by the mere touch of a hand, can command any portion of the heavens with as much ease as if it were wielding a toy. We would not omit the perfect micrometer by which the angles and positions of the double stars are accurately measured, also the craters in the moon and the size of the planets. This style of micrometer was designed by the eminent astronomer, S. W. Burnham, of Chicago. In short these gentlemen have succeeded in combining, with their own grand achievements, in this single stand, nearly all of the late improvements in mountings for astronomical telescopes by our leading astronomers.



ROTARY HAMMER.—A rotary hammer striking 400 blows a minute has been invented by a citizen of Jackson, Cal. It consists of a series of hammers arranged so that their faces extend beyond a periphery of a wheel and strike a sliding rod, to which is adjusted a drill, a hammer, or a quartz crusher, or whatever is needed for the desired work. When these hammers strike the rod they slide off out of the way in the most remarkable manner, without perceptably decreasing the velocity of the wheel. They spring into position again and never miss a stroke. The machine now in operation contains eight hammers, and one man turning it can deliver 400 powerful blows a minute.

ROTARY STEAM ENGINE.—Mr. John McGowan, Coal Valley, Pa., has invented a revolving cylinder steam engine provided with a concentrically arranged internal disc containing the exhaust passage, and a bevel-edged, fan-shaped, stationary abutment, through which extends the inlet passage, in combination with three hinged doors, in the form of a right angle, swinging laterally into side pockets or recesses in the cylinder while passing the said stationary abutment, and by the force of the ingoing steam opened outwardly and directly across the concentric main space of the cylinder, each with its front edge resting in its appropriate radial groove formed in the inner face of the removable head of the engine, whereby a proper and resistant bearing is given the front edge of each swinging door.

MARKETS.

Office of TRADE REVIEW AND WESTERN MACHINIST.

FRIDAY EVENING, September 23.

FINANCIAL.

The demands of borrowers have been freely met at the customary rate of 7 to 8 per cent. Banks are well supplied with loanable funds. Time paper is placed at 6 per cent, and call loans are negotiated at 5 per cent. The market for Eastern exchange is easier and sales are made between banks at 25c. per $1,000 discount. Foreign exchange is firm and steady with but a moderate demand. Local securities are firm, with moderate transactions.

NEW YORK.—The stock market is generally weak and speculation dull. The only activity in railway stocks has been in North-Western common and preferred; prices generally show depression. Sterling exchange dull; sight drafts, $4.88@4.89; 60-day bills, $4.83½@4.84¼. Money on call, 6@8 per cent., closing at 6.

IRON ORE.

A somewhat better feeling characterizes the ore market, but no great absorption of the unprecedented amount of ore on dock is looked for until the iron strike is over, and the now disused pig furnaces have started up.

IRON.

An increased amount of business has been done. The effect of the great strike on steadying prices still continues, preventing any decline in the rates of pig metal. Buyers only come forward for small lots in order to meet pressing requirements, and sellers are not apparently axious to push business. We quote for American pig $26@27 for No. 1 X; $24 for No. 2 X, and $21.50@22.50 for gray forge. Small spot lots command $2 to $2 per ton above these quotations. Large sales of foreign pig have been made at full prices. We quote Eglinton at $22.75@$24.00; Langloan $26@$27; Gartsherrie $26@26.50; Carnbroe, $24.50@$25; Glengarnock, $24 50@$25; Shotts, $26 50@$27; Coltness, $26.00@27; Summerlee, $26@$26.50. For scrap, which is in moderate demand, prices have stiffened. American steel rails are unchanged, the demand chiefly being for moderate sized parcels for early delivery at $45 to 47 at mill, at which prices sellers decline, however, to accept orders for Winter delivery. The principal mills are fairly supplied with work for the next four months, but buyers anticipate still lower prices, and are unwilling to increase their bids Muck bars are quoted all the way from $41 to 43, and demand absorbs all produced. Charcoal blooms are strong and steady at $70. Merchant bar is weak at $2.50 to 2.55. Customers are getting along with very little iron though demand is expected to improve as soon as prices settle. For plate and tank iron prices are firm and the demand active.

CINCINNATI—Reported by Rogers, Brown & Co.—A fair amount of business transpired during the week past, the bulk of sales being for for forward delivery. This form of purchasing metal is greatly increasing in favor in this market. The large Southern furnaces prefer contracts ahead, and the obvious advantages to large consumers in having deliveries made according to requirements lead to a very general adoption of the practice. Contracts are now in force here for deliveries running to July 1883. The range of prices continues about the same as for the past month. Stocks are not accumulating and consumption is large. A slight improvement in demand for high class cart wheel irons is noticeable. We quote for cash: Hot Blast Foundry—Hanging Rock, C.C., No. 1, $26.50@$27.00; Hanging Rock, C.C., No. 2, $25@$26.00; Southern No. 1, $24.50@$26.00; Strong Coke No. 1, $23.50@$24;50; Strong Coke No. 2, $22 50@$23.50; Strong Coke No. 3, $21.50@$22.50; Soft Stone Coal No. 1, $22.50@23.00; Soft Stone Coal No 2, $21.50@$22.00; Forge—Strong Neutral No. 1 Mill, $21 50@$22.00; Cold Short No. 1 Mill, $20.50@$21.00. Car Wheel and Malleable—Hanging Rock C.B., $32@$34; Hanging Rock W. B., $26@$29; Southern Car Wheel Iron, $32@$36; Lake Superior Car Wheel Iron, $30@$33; Lake Superior Malleable, $30@33.

CINCINNATI—Reported by E. L Harper & Co.—Prices during the week have ruled steady, and, the season considered, the volume of business has been above the average. Some of the furnacemen are not anticipating advanced prices in the near future, which is evidenced in slight concessions made this week on large foundry iron orders for contracts extending through the balance of the year. The backbone of the mill strike seems very much weaker and the indications point to an early resumption.

COPPER.

The copper market is slightly weaker. A fair amount of business has been transacted. Lake Ingot has changed hands at 18⅛@18¼c, and "Anchor" brand and Baltimore at 17¾. The jobbing trade is quiet at 18⅛@19c for Lake. The pool sales are now stated to amount to 10,000,000 lbs. London cables: Best Selected, £72@£72 10s; Bars, £67@£67 10 The combination prices of manufactured copper are unchanged. We quote: Sheathing, 28c; Braziers', 30@32c; Bolt, 20c; copper bottoms, 31@32c; American yellow sheathing metal, 20c; y. m. bolt, 22c; English yellow sheathing metal, 16c in bond.

LEAD.

There is an improved feeling in the market. Lead is pretty scarce for immediate delivery. Refined lead is quoted at about $4.75 and common at $4 70.

ZINC.

The market has remained quiet at 5 cents for large lots and 6c for jobbing. Sheet zinc is quiet at 7@7¼c. We note a decline of 25 cents on the whole list of sheet zinc.

TIN AND TIN PLATES.

The tin trade is quite active without change of prices. The London market is quoted at £106 10s by the latest cable. The demand for tin plates continues fair and the market is steady. We quote: Charcoal bright, $6.25 @6.75; Ternes, at $5.75 @ 7.75; Cokes, $4.00@5.75; do Ternes, $5.25@5.75.

HARDWARE.

The amount of business done in general hardware is large; prices have been steady and the tone of the market strong. The outlook for fall business is very encouraging, and as stocks of builders' hardware and mechanics' tools in first hands are unusually light, the demand is likely to continue in excess of supply. There is an increased consumption of domestic ware. The sales of gas and stove fittings have been very large. There is an extra demand for nails. Stocks are light and prices firm We quote $3.65 net for 10d to 60d. The hope of the trade is the possible early resumption of the nail mills on the Ohio river. The Western mills that are running are putting in time on such sizes as are shortest in the market. The new Western Nail Works at Belleville had 50,000 kegs sold ahead before work was commenced. The demand is especially active for scoops, shovels and saws, and other tools common to farm use. An entire new list has been adopted by the tack manufacturers. The revised discounts of Cast Butt manufacturers show a decline from former prices.

LUMBER.

Lumber is moving at a good rate, with a fair prospect of a heavier trade later. Values on the whole have considerably stiffened. First quality fencing sells readily, and so with other leading specialties. More activity is apparent in hardwoods, of which our yards offer a fair stock and assortment. Those who buy now will avoid the risk of higher prices later in the fall from increased cost of water and railroad freights.

WOOL.

The recent slight advance in prices in the Eastern markets is sustained, and there have been active transactions. In sales of washed fleeces Ohio No. 1 has realized 44@45c, Ohio X and above 40@42c, Ohio XX and above 44c.

LUMBER.

PLANK. MIXED WIDTHS.
2 inch, 12, 14 and 16 feet, together.

A 1 and 2 uppers	$50
A 3	40
B	35
C	20
D	15
E	12

1¼ and 1½ inch.

A 1 and 2 uppers	$48
A 3	40
B select	32
C	20
D	14
E	12

BOARDS.
One Inch, mixed widths.

A 1 and 2 uppers	$44
A 3	36
B select	30
C	19
D	14
E	12

STOCK BOARDS.
12 Inches wide.

A 1 and 2 uppers	$45
A 3	38
B	32
C	21
D	16
E	13

STRIPS.
6 Inches wide.

A 1, 2, and 3	$42
B	32
C	22
D	16
E	12
Norway Fencing Strips	17
Norway Flooring Strips	25

WORKED LUMBER
FLOORING.

Flooring—A 3	$42
B	35
C	24
D	20
Norway Flooring—A 3	28
C	22
D	18
Matched Drop Siding, 6 inches—A 3	42
B	38
C	24
D	20

Beaded Ceiling $2 higher than Flooring.

One half inch Bevel Siding—A 1 and 2	24
A 3	20
B	18
Ash Flooring—A 1 and 2	40

BILL STUFF.

Small, joists, 12, 14 and 16 feet	$14
Timber, larger than 8x8 special.	
Timber, longer than 18 feet, adds about $1 per foot per M. extra.	
Cedar Posts, large	30 00
" " medium	25 00
" " small	$15 to 20 00

SHINGLES, LATH AND MILL WORK

Shingles XXX	$ 4 25
Clear Butts	3 25
Lath	2 75@3 00

Surfacing, one side, adds $1.25; two sides $1.50
Matching, flooring and drop sidings, $2.50.

LAKE FREIGHTS.

COAL.

Buffalo to Chicago	$.62½@.65
Toledo to Chicago	1.00
Cleveland to Chicago	70@75
Erie to Chicago	70@75
Oswego to Chicago	1.50
Fairhaven to Chicago	1.30
Buffalo to Millwaukee	70@75
Cleveland to "	70@75
Erie to Milwaukee	75
Buffalo to Racine	80
Buffalo to Kenosha	85

IRON ORE.

Marquette to Lake Erie ports	1.25
Escanaba to Lake Erie ports	90@95
Escanaba to Chicago	90@95
Marquette to Chicago	1.15@1.20

Vacuum.

Anyone who has had much experience in the indication of engines will have noticed how assiduous the attendant—particularly an old hand—becomes with the spanner or screw-key, tightening up the glands and stuffing-boxes of his engine, and making all steam-tight and air-tight as soon as he catches sight of the indicator. He will very often, too, be seen to give a fresh supply of tallow, or other lubricating material, to his pistons and valves; but, above everything else, he will be careful to see that no joint or stuffing-box in connection with any part of his condensing cylinder is likely to be drawing air; and he will further, if possible, increase the supply of injection or condensing water going to the engine. The object of all this is to get as good an indication as possible on the indicator card, as well as in the condenser of what is known as "vacuum," upon the degree of perfection of which most enginemen particularly pride themselves, and than whom none better understand the full value and importance. Indeed, it would be well if many so-called engine experts and inspectors, as well as steam users generally, were more alive to the great importance of this "vacuum." Almost everybody is aware of the advantage of reducing as much as possible the "back-pressure" upon an engine piston; and the securing of a good "vacuum" really means the diminution, as far as possible, of the "back-pressure," or reducing to a minimum the resistances opposing the piston's motion.

If we consider for a moment the saving effected in a large engine by the improvement of only a single pound in the effect of the vacuum in the condensing cylinder, we shall probably be surprised at what such a saving really represents in actual money value. Take the case of an ordinary compound engine, say with high and low pressure cylinders of 22 in. and 44 in. diameter; respectively 6 ft. stroke, and running 50 revolutions per minute, such an engine as we commonly find in our large cotton mills: We shall find the "constant" for the low-pressure cylinder of such an engine to be about 27½, that is to say, for every 1 lb. average pressure on the low pressure piston, a duty will be given out equal to 27½ indicated horse-power. It will frequently happen that the maximum effect of the vacuum obtained will not exceed 9½ lbs., and we have on many occasions seen it improved by very slight alterations and attention to air-tightness, etc., to 11½ lbs. This improvement alone, with an engine of the above dimensions, would represent, therefore, a clear gain of something like 55 indicated horse-power. Now let us "figger" once more. Assume the engine to be burning, say 4 lbs. of coal per indicated horse-power per hour, and to be working ordinary mill hours—that is to say, 56 hours per week; multiplying, we get 55 I. H. P. by 3 lbs = 165 lbs of coal per hour =9,240 lbs. (or say, something over four tons) of coal per week. The fact of placing engines under independent supervision, and indication often far more than repays the annual amount of subscription by the increased care and attention paid to their working by those in charge.

The causes which lead to impairment of the vacuum are so numerous and varied that it would take too much space in the present article to attempt to treat them fully. We have been applied to for information on this subject by firms who appeared to have exhausted every resource in trying to get at the cause of their high back-pressure, but ineffectually; and in such cases we have generally suggested that they should place the matter in the hands of some well known expert, most of whom have had so much experience that after indicating and looking round they are able to point out the cause at once, and thus save much expense in experimenting.

Overworking Boilers.

In our examination of boilers, says the *Locomotive* for August, we not infrequently find a strange disregard of all rules and regulations for the safe management of boilers. We say strange, for it hardly seems possible that intelligent men would encourage or allow a disregard of rules that are known to be safe. We can account for it only on the ground that the desire to meet every demand for his product blinds the manufacturer to the danger of overworking his boilers. We have of late found safety-valves over-weighted fifteen and twenty pounds. When the engineer was asked why he had changed the weight on the safety-valve, his reply was that his employer wanted more steam, and had ordered him to increase the weight on the valve. These men would feel very much aggrieved to be accused of dishonesty. But suppose the boiler had exploded in the meantime and killed several persons. Would these men have stood up and said: "We increased the load on the safety-valve and are responsible for this disaster?" Probably they would have kept very quiet, and thrown the responsibility on the maker.

To Silver Iron.

First cover the iron with mercury, and silvers by the galvanic process. By heating to 300 deg. C., the mercury evaporates and the silver layer is fixed. Ironware is first heated with diluted hydrochloric acid, and then dipped in a solution of nitrate of mercury, being at the same time in communication with the zinc pole of an electric battery, a piece of gas carbon or platinum being used as an anode for the other pole. The metal is soon covered with a layer of quicksilver, is then taken out and well washed and silvered in a silver solution. To save silver the ware can be first covered with a layer of tin; one part of cream of tartar is dissolved in eight parts of boiling water, and one or more tin anodes are joined with the carbon pole of a Bunsen element. The zinc pole communicates with a well-cleaned piece of copper, and the battery is made to act till enough tin has deposited on the copper, when this is taken out and the ironware put in its place. The ware thus covered with tin chemically pure and silvered, is much cheaper than any other silvered metals.

THE number of cars operated the past twelve months by the Pullman Palace Car Co., was 773; the number of passengers carried, 1,964,000; number of miles run 54,104,000.

Iron and steel combined make a surprisingly strong resistance to projectiles.

E. F. ENSIGN,
JOBBER OF
Agricultural Implements,
WAGONS, FERTILIZERS, SEEDS, &c.
The Empire Grain and Fertilizer Drill and Twine Binding Harvesters Specialties.
134 ST CLAIR STREET, CLEVELAND, O

Cleveland Wholesale Prices.

HARDWARE.

Adzes.

Carpenter's ..... per doz $18 40
Ship ..... " " 18 75
Heavy railroad ..... " " 19 50

Axes.

Hunt's ..... ℔ doz $ 9 50
Lippincott's Crown ..... ℔ doz 9 00
Cut More ..... ℔ doz 9 00
Peck's Double Bit ..... ℔ doz 22 00
" Champion Blade ℔ doz 11 00

Anvils.

Eagle, Amer... per lb. 10c dis 20
Wright's ..... 10¾c@11c
Armitage's Mouse Hole 9¼@9¾c
Trenton 10¾c
Wilkinson's 10¾c

Anvil Vise and Drill.

Millers Falls Co. $28 ..... dis 20
Cheney Anvil and Vise .dis 25&2

Vises.

Solid Box, list of July 1, '79, ... dis 35
Solid "Crown" (A. H. Hildick) ..... 40 to 100 lb. 15c net
Solid, Peter Wright's 15½
Solid, Wilkinson's 13½
Parallel, Parker's ..... dis 40
Saw Filers, Hopkins' ..... dis 40

Augurs and Bits.

℔ doz $17.50, dis 10
Reading ..... dis 45&10
Cowell Hand Vises ..... dis 20
Richardson's Vise and Anvil ..... dis 25

Augurs and Bits.

C S cut augers ..... dis 40&10
do do do bits ..... 40&10
D C gimlet do Ives ..... dis 50
Snells bits ..... dis 40
Russell Jennings' augers dis 16⅔ &10&10
Cook's pat augur ..... 40&10

Animal Pokes.

Berea, per doz 4 00
Eagle, per doz 5 00

Apple Parers.

Domestic & Reading ℔ doz .$7 50
Turn Table 5 00

Bolts.

Machine ..... dis 60
Bolt ends ..... dis 60
Plow ..... dis 50
Plow, R. B. & W ..... dis 40
Cast Iron Barrel Shutter, etc ..... dis 50&10
Cast Iron Chain (Sargent' list) ..... dis 60&10
Ives' Pat. Door Bolts ..... dis 50
Wrought Barrel ..... dis 55&10
Wrought Square ..... dis 55&10
Wr'g't Shut'r, all iron, Stanley's list ..... dis 50&10
Tire, R. B. & W., new list ..... dis 70&10
Stove, American Screw Co.'s ..... dis 40
Bolt Ends ..... dis 60

Bellows.

Dis

Blacksmith's com new list, 45 ℔ct
Moulder's new list, dis 25 ℔ cent
Hand, new list, 25 per cent

Butts.

Dis

Wrought brass ..... 65&10
Cast, loose joint 55
Pin, loose 50
Wrought, fast joint narrow 45
Wrought fast joint broad 45
Wrought loose joint broad 55
Wrought table and back flaps 45
Loose joint, without acorns 55
Ten per cent. extra dis for cash.

Cleveland Stamped Elbows

Genuine Russia Iron

4 inch per doz 4 50
4½ do do 5 50
5 do do 7 50
5½ do do 8 50
6 do do 9 50
do do 11 00

Planished American Russia Iron

inch, per doz 4 00
4½ do do 5 00
5 do do 6 50
5½ do do 7 50
6 do do 8 50
do do 9 50

Charcoal Iron

4 inch, per doz 2 00
4½ do do 2 50
5 do do 3 50
5½ do do 4 00
do do 4 50
do do 5 50

25 per cent

Chisels.

Hot and cold cutting ..... ℔ lb 30
Railroad track 30
Machinists 30
Mallet head 50
Tape 50
Packing 50
Stone cutters 50

Crowbars.

Cast steel ..... ℔ lb 8¼
Iron, steel points 6½c

Cutlery, Pocket and Table.

Meriden Cutlery Co., table..net
Am. Miller Bros.' Cutlery Co ..... dis 25
Humason & Beckley, pocket 33⅓
Naugatuck Cutlery Co...list net
Aaron Berkenshaw's pocket dis 25

Coopers' Tools.

Bradley's ..... dis 40
Barton's ..... dis 20

Chains.

Coil by cask,

3-16	¼	5-16	⅜	7-16	½
10¼	9	8	7	6¾	6¼

Drills and Drill Stocks.

Blacksmiths', each...$2.50 dis 10
Blacksmiths', self-feeding, each 7.50 dis 20
Breast, P. S. & W ..... dis 20&10

Drawing Knives.

Witherby's ..... dis 65@10
Nobles Mfgr. Co 15
Adjustable handle 20

Emery and Emery Paper.

Regular Numbers ..... ℔ lb 6c
Flour and F. F ..... ℔ lb 4c
B. & A. Emery Paper ..dis 30&5

Enameled and Tinned Ware.

Kettles ..... dis 50
Sauce Pans ..... dis 50
Tinned Sauce Pans ..... dis 50

Files.

Auburn ..$5 to £. dis 35 pr cent
E. M. Boynton's, new list ..dis 25
J. & Riley Carr ..... 4.50 to £.
Johnson & Bro ..... dis 30
Butcher's ..... dis 30
Walter Spencer & Co.'s "Diamond" ..... 4.50 to £.
Fisher's ..... 4.50 to £.
Moss & Gamble ..... 4.75 to £.
H. Disston & Sons (new list) ..... dis 40 per cent
Heller Bros.' Horse Rasps ..... dis 25
Nicholson ..... dis 40
New American ..... dis 40
Union File Co ..... dis 40

Grindstones.

Ohio ..... 1¼@1⅞ ℔ lb
Nova Scotia ..... 1¼@1¾ ℔ lb

Hammers.

Maydole's ..... dis 15
Cheney's ..... dis 25
Hartford Hammer Co ..... dis 20
Humason & Beckley. ..... dis 50
Verree ..... dis 5
Magnetic Tack, Nos. 1, 2, 3, $1.25, $1.50 and $1.75, dis 25&10
Nelson Tool Works ..dis 40&10
Warner & Noble's ..... dis 5
Kip's ..... dis 15
Yerkes & Plumb ..... dis 15
Wilkinson's Smiths' 11¼c ℔ net

Hatchets.

Yerkes & Plumb:--Shingling, Nos. 1, 2, 3, ℔ doz $7 50, $8 00, $8 50, dis 25
Claw, Nos. 1, 2, 3, ℔ doz $8 25, $8 75, $9 25, dis 25
Lathing, Nos. 1, 2, 3, ℔ doz $7 50, $8 00, $8 50, dis 25

Nails.

10 to 60d $3 65
8 and 9d 25
6 and 7d 50
4 and 5d 75
3d 1 50
2d 2 75
3d fine 3 00
2d fine 3 75
⅞ inch 3 00
4d barrel 1 00
1¼ inch barrel nails 1 50
1⅛ do do do 1 75
1 do do do 2 50
⅞ do do do 3 00
Cut spikes, all sizes 25
Clinch nails, all sizes 1 75
Casing and box nails 75 cts advance
Finishing nails, $1 25 do
Tobacco nails, 50 cts do

Nuts and Washers

Nuts, square ..... 7c off list.
Nuts, hexagon ..... 6c. off list.
Washers ..... 6c off list.

Picks.

Railroad, 4 to 5 lbs ..doz $7 75
5 to 6 lbs 7 75
to 7 lbs 8 50
7 to 8 lbs 9 50
Railroad Tamping Pick 7 to 8 lbs ..doz 13 50
Mill Picks per lb 75c

Rivets.

Iron ..... dis 40
Tinned ..... dis 40
Copper ..... dis 33⅓

Squares.

Dis

Steel or iron, case lots 50
Try squares and T bevels 40

Spikes—WROUGHT

All lengths by ¼ inch 4½c
do do do 5-16 ..... 3½
do do do ⅜, 7-16 & ½in 3¼

Shovels and Spades.

Ames' new list, July 1, 1881, ... dis 15
Old Colony ..... dis 15
Remington's (Lowman's Patent) ..... dis 30
Rowland's ..... dis 40 and 10
Griffiths ..... dis 40&10

Saw Sets.

Boynton's patent X Cut, per doz $12; Hand Saw, per doz $10. ..... dis 20
Stillman's Genuine, per doz $3 50 and $5 50 ..... dis 20
Stillman's Imitation, per doz $3 25 ..... dis 20&10
Common Lever, per doz $2 ..... dis 30&10
Leach's No. 0 $8; No. 1 $15; ..... dis 15
Hammer, Hotchkiss $5 50, dis 10
" Bemis & Call Co.'s new patent ..... dis 40&5
Bemis & Call Co.'s Lever and Spring Hammer .dis 30&5
Bemis & Call Co.'s Plate .. dis 10
" " Cross-cut dis 12½
Aiken's Genuine ..$13, dis 50&10
" Imitation ..... $7, dis 50
Hart's Patent Lever ..... dis 20
Disston's Circular ..... dis 40

Sad Irons.

From 4 to 10 lbs ..... per lb 3¾ net
Self-Heating ..... ℔ doz $9 net
" Tailors ..... ℔ doz $18 net
Gleason's Shield and Toilet ..... dis 25
Mrs. Pott's Irons, double pointed ..... dis 35
Mrs. Pott's Irons, square back ..... dis 35
Enterprise Star Irons ..... dis 40
Combined Fluter and Sad Iron ..... ℔ doz $15, dis 15

Scales.

Hatch, Counter, No. 171 ℔ doz. $42, dis 37½&10
Union Platform ..... $6, dis 45
Fairbanks' ..... dis 20
Buffalo Scale Co ..... dis 20&5
Forsyth Scale Co ..... dis 25
Howe's ..... dis 20&10
Chatlilon's Eureka ..... dis 25
Family Universal ..... dis 50
Scale Beams ..... dis 33⅓&10

Bag Holders.

Sprengle's Pat, $18.00 per doz 40 per cent. dis.

Planes.

Ohio Tool Co ..... dis 25
Sciota ..... dis 30
Bailey's Pat. Adjstble. dis 20@25

Rules.

Stanley ..... dis 66⅔ and 10

Sash Locks. Discount.

Payson Mnfg. Co. "Perfect" ..42
Simmons' Sash Supporters ..20

Hinges.

Champion double acting spring hinges ..... dis. 30
Screw & Strap 8@12 in. ..... $6. net
Gravity Locking Blind Hinges, Sargeant & Co. 70&10

Screws. Dis

Flat head iron or steel per cent dis. 30
Flat head brass 30
Round head iron or steel. 25
Round head brass 20
Brass and Silver capped 40
Japanned, list of Plain Screws 20
Coach, patent Gimlet point, list per 100 60
Lag, taper points 60
Bed 10
Machine, flat head, iron round head, iron 55
Bench, iron 50
wood, beech, per doz $3 ..... 55&10
wood, hickory 10
..... 20&10

Valves. Dis.

Jenkins' Patent Gate Valves ..35
" " Globe " ..40
" Standard Packing " ..20

Wrenches.

Coe's genuine ..... 40 & 10
Coe's imitation wrought bar. 60
Mechanics' ..... 60 and 10

Wire.

Brass and Copper ..... dis 20
Bright & annealed, Nos. 0 @ 18 dis 50@52½
" " Nos. 19 @ 26 dis 60
" Nos. 27 @ 36 dis 65
Coppered ..... Nos. 0 @ 18, dis 45
Galvanized, Nos. 0 @ 18, market list, ... dis 40@42½
Tinned, Nos. 0 @ 18, ... dis 40@45
Cast steel ..... dis 40
Tinned Broom Wire, Nos. 18@25 ..... dis 55
Annealed Fence, Nos. 8 and 9 ..... dis 55@52½
Annealed Grape, Nos. 10 to 14 ..... dis 52½
Galvanized Telegraph, Nos. 7 to 9 ..... ℔ lb 7½c
Galvanized Telegraph, Nos. 10 to 11 ..... ℔ lb 8¼c
Galvanized Telegraph, No. 12 ..... ℔ lb 10¼c
Fence staples ..... ℔ lb 5½@5¾c
Fence Staples, galvanized, ... ℔ lb 7@7¼c
Stubs Steel Wire ..... $7 00 to £
Barb Wire, painted 8¼c
Barb Wire, galvanized 9¼c
Crucible Steel Ropes from ⅜ in. at 9c to 1¼ in. at 52c
Best Selected Iron Ropes from 3-16 in. at 3c. to 1¼ in. at 33c

Boiler Plates.

("Gaylord"--Standard Quality.)

C. No. 1	1 50
C. H. No. 1 Shell	1 50
C. H. No. 1, 50,000	4 75
C. H. No. 1, 55,000	5 25
C. H. No. 1 Flange	5 75
Firebox	6 50
T. S., 60,000 (as per)	6 50
T. S., 65,000 (act of)	
Homo. Steel, 70,000 (of Cong)	7 50

Heads, ⅛c ℔ lb extra.

N.B.—Eastern brands of boiler plate at from 2-10 to 3-10c ℔ lb less than above prices.

Sheet and Tank Rivets. "Norway."

All sizes ..... dis. 15

Boiler Rivets—" Albany "

⅜, ½, 11-16, and ¾ in. diam .5 50

Boiler Makers' Tools.

Doty's Power Shears ....net list
" Hand Lever Shears .net list
" Power Punch ..... net list
" Hand Punch ..... net list
Steel Screw Punch ..... net list
Iron Screw Punch ..... net list
Boiler Plate Rolls ..... net list
Buffalo Forges & Blowers dis 20
Watson's " " net list
Spring Tube Expander .... dis 15
Roller Tube Expander ..net list
National Tube Cleaner ... dis 20
Wire Flue Brushes ..... net list
Anvils--"Peter Wright" 12½ ℔ lb
Solid Box Vises ..... net list

Nuts, Bolts, etc.

Square & Hex. Nuts ....7 off list
Washers ..... list
Machine Bolts ..... dis 60
Bolt Ends ..... dis 60
Boiler Patch Bolts ..... net list

Boiler Tubes.

"National" Standard Gauge 1 inch to 10 inch ..... dis 37½
"National" Standard Gauge 11 inch to 15 inch ..... dis 25
"National" Special Locomotive Tubes ..... net list

IRON AND STEEL.

Flat Bar.

1¼ to 4 by ⅜ to 1 inch 2 60
4¼ to 6 by ⅜ to 1 inch 2 70
1¾ to 6 by 1¼ to 1½ inch ... 3 00
1¼ & 1¾ by ⅜ to ¾ 2 70
1 & 1¼ by ⅜ to ¾ 2 70
⅝ ¾ and ⅞ by ⅜ to ¾ 3 00

Round,

1 to 1⅞ inch 2 60
2 to 2½ 2 80
2¾ to 3¼ 3 10
3½ to 4 ..... 3 60
4¼ to 4½ 4 10
4¾ to 5 ..... 4 80

Square.

1 to 1⅞ inch 2 60
2 to 2½ 2 80
2¾ to 3¼ 3 10
3½ to 4 ..... 3 60
¾ to ⅞ 2 70

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch . 2 80
1 to 1¾ by ¼ and 5-16 do 2 90
¾ to ⅞ by ¼ and 5-16 do 3 10
⅝ to ¾ by ¼ and 5-16 do 3 60

Half Oval and Half Round.

Wagon box iron ¾ and ⅞ . 4 10
1-10c per lb extra will be charged for cutting to specified lengths

Light Band.

1¼ to 6 by ¼ to 3-16 ..... 3 10

Hoops.

1¼ to 2 , Nos 16 to 18 ..... 3 50
1¼ to 4 do 13 to 15 ..... 3 40
1-10 extra for each gauge lighter

Sheet Iron.

No 22 to 24 ..... 4 50
No 25 to 26 ..... 4 70
No 27 ..... 4 90
No 28 ..... 5 30

English Steel.

Best cast ..... ℔ lb 15½c
Extra cast 16½c
Round machinery, cast 10c
Swaged, cast 18c
Best double shear 15½c
Blister, 1st quality 13c
Refined tool steel 16½c
Spring calking ..... 7¼@7½c
German steel, best 11c
2d quality 10c
3d quality 9c
Sheet cast steel, 1st quality 15½c
2d quality 14½c
3d quality 12½c

American Steel.

Best brands of refined cast steel, ⅜ to 2 inches 12c
Crucible cast 7c
Open-hearth ditto 4½c
Hammer cast steel 9c
Spring cast steel 7½c
Bessemer and open-hearth spring 5c
Ditto plow 4½c
Steel boiler plate ..... 6½@7c
Bessemer machinery .. 5 @6c
Spring and calking ..... 7¼@7½c
Tire 5
Sleigh shoe 5

Bessemer Steel Tire.

⅝ to 1 by 3-32 ..... 4½ ℔ lb
⅝ to 1 by ⅛ to 5-32 ..... 4½ ℔ lb
⅝ to 1 by 3-16 to ¼ ..... 4¾ ℔ lb

Miscellaneous Cast Steel.

Auger and auger bit 1
Axle steel for wagons 7
Frog points and plates 8
Frog size bars 8
Pick, hammered 8½
Mattock, beveled 10
Table cutlery 9
Trap spring steel 7½
Pike and cant hook 10
Coal and granite 9
..... 8½

TINNER'S STOCK.

Tin.

Banca, ... per lb. 28@29c
Straits ..... " 24@25c
English ..... " 24@25c
Bar ..... " 24@25c
..... 27c

Tin Plate,

IC 12x12 charcoal ..... $ 6 50
IC 14x20 do ..... 6 25@6 50
IX 14x20 do 8 25
DC 12½x17 do 6 00
DX 12½x17 do 8 00
DXX, 12½x17 do 10 00
DXXX, 12½x17 do. 12 00
IC, 20x28 do 14 50
IX, 20x28 do 15 50
IC, 14x20, Best Roof 6 00
IX, 14x20, do 8 00
IC, 20x28 do 13 00
IX, 20x28 do 14 50
IC, 10x14 Best Coke 5 75

Solder.

Half and Half, in bars 15½
No. 1 do 14½
Spelter Solder. 25

Pat Planished Sheet Iron.

[A] ..... per lb 10½c
[B] 9½c

Nos	10 to 14	15 to 20	21 to 24	25 to 26
Com	3-60	3-80	4-00	4-20
Char	5-60	5-60	6-00	6-20

Sheets over 28 in. wide ½c extra

Zinc.

Sheet, cask ..... 7½@ 7¾
Sheet, open ..... 8@ 8½

Inners' Tools & Machines

Machines (P. S. & W.) list add 20
Tools (P. S. & W.) ..... add 5

Plumbers', Steam and Gas Fitters' Supplies.

Wrought Iron Pipe ..... dis 60.
Steam Brass Goods ..... dis 45
Water " ..... dis 40
Enameled Pipe ..... dis 65
Artesian Well Casing ... net list
Hydraulic Tubes ..... net list
Malleable Iron Fittings .net list
Cast Iron Fittings ..... dis. 45
Globe Valves ..... dis. 35
Angle Valves ..... dis. 35
Check Valves ..... dis. 35
Safety Valves ..... dis. 45
Ludlow Gate Valves ..... dis. 30
Ball Gauge Cocks (net per dozen) $15
Compression Gauge Cocks dis. 25
Montg'r'y Gauge Cocks ...dis. 35
Register Gauge Cocks (net per piece) $1 00
Cylinder Cocks ..... dis. 30
Air Cocks (net per dozen) .. $2 75
Oil Cups ..... dis. 30
Steam Gauges ..... dis. 40
Water Gauges ..... dis. 40
Scotch Glass Tubes ..... dis. 50
Steam Whistles ..... dis. 45
Pipe Tools ..... special
Globe, Angle and Check Valves (Star's regrinding) ..... dis. 25
Duplex Injectors ..... net. 20
Soil Pipe & Fittings ..... dis. 20
Sinks ..... dis. 25
Bath tubs &c ..... dis. 20

Babbitt Metal.

No. 1 ..... ℔ lb 16
" 2 ..... " 14
" 3 ..... " 10
" 4 ..... " 8

LEAD.

American, ℔ lb 5½c
Bar, ℔ lb 6½c dis 10 per ct
Pipe, ℔ lb 7½c dis 10 per ct
Sheet, ℔ lb . 8c dis 10 per ct
Tin-lined pipe ℔ lb 15c dis 10 pr ct
Shot Drop 7c; Buck 7c
Chilled Shot 8c

COPPER.

Lake Ingot ..... 18¼@18½c
Baltimore 17½c
Arizona 17½c
Sheathing Braziers Copper, Bolts, &c. 17½c
Brazier's Copper, ordinary sizes, 16 oz. per sq. foot, and over per lb 30c
Brazier's Copper, ordinary sizes, under 16 oz. and over 12 oz. per sq. foot, per lb. 32c
Brazier's Copper, 10 oz and 12 oz. per sq. ft. per lb. 34c
Brazier's Copper lighter than 10 oz. per sq ft. per lb. 36c
Circles less than 84 inches in diameter ..... per lb. 33c
Circles 84 inches in diameter and over ..... per lb. 30c
Segment and Pattern sheets per lb. 33c
Locomotive Fire Box sheets per lb. 30c
Sheathing Copper, over 12 oz per sq ft ..... per lb. 28c
Bolt Copper ..... per lb. 30c
Copper Bottoms ..... per lb. 31@32c
No copper is Sheathing except 14x10 inches, and not to exceed 34 oz. to the sq. ft

Tinning.

14x18 ..... per sheet 6c
All other size sheets, 2½c per square foot For tinning both sides, double the above amount.

SCRAP IRON AND OLD METAL

DEALER'S SELLING PRICES.

Net Tons.

No. 1 wrought scrap $24
Sheet and hoop " ..... 10@11
Cast scrap, (No. 1 heavy) 19
Cast Scrap (Stove Plate) 12

OLD METALS.

Old copper per lb 15c
No. 1 H. Brass per lb 14
Heavy yellow Brass do 12
Light Brass per lb 12
Scrap Zinc per lb 6½
Tea Lead per lb 4
Heavy Lead per lb 3

PIPE, WROUGHT.

Standard Wrought Iron Lap Welded Steam and Gas

Inside Diameter. Inches.	Plain, Price Per Foot.	Galvan or Enameled Per Foot.	Outside Diameter Inches.	Weight Per Foot.
⅛	08		.40	.24
¼	08	$0 11	.54	.42
⅜	09	12	.67	.56
½	11	15	.84	.85
¾	13½	19	1.05	1.13
1	19	28	1.31	1.67
1¼	27	40	1.66	2.26
1½	33	47	1.90	2.69
2	46	64	2.37	3.66
2½	75	1 00	2.87	5.77
3	95	1 30	3.50	7.55
3½	1 25	1 70	4 00	9.05
4	1 50	2 05	4.50	10.73
4½	1 75	2 40	5.00	12.49
5	2 25	3 00	5.56	14.56
6	2 75	4 00	6.62	18.76
7	3 75		7.62	23.00
8	4 75		8.62	28.00
9	6 50		9 68	34.40
10	8 00		10.75	40 64
12	12 00			54.65

Discount, 62½ per cent; galvanized, 62½ per cent.

BRASS.

Cash prices for Roll and Sheet Brass. For less quantity than 100 lbs. add 3c per lb.

High Brass.

All Nos not thinner than 16 No. 28, wider than 2 in. not wider than 14 inch 30c
All Nos to No. 28, inclusive, and widths over 14 to 20 in. inclusive 35c
All Nos. to No 28, inclusive, and widths over 20 to 30 in. inclusive 38c
½c per lb. advance on each No above Nos. 28 to 38, inclusive
All Brass thinner than No. 8 is Platers' Brass at 58c
Sheets 24x48, and all sheets cut to particular sizes and lengths under 30 inches, in width wider than 2 inches .37c

Low Brass.

4c per lb. more than High Brass.
Gilding metal 8c per lb. more than High Brass.
Platers' or Gold Metal

In Bars	48c
Sawed	51c
Planed or Polished	54c

For Slitting.

Metal in width in. to ½ in. to No. 28, inclusive, 1c per lb. advance.
Metal, in width 2 in. to 1 in., thinner than No. 28, 2c per lb. advance
Metal, in width ⅛ in. to ¼ in. thinner than No. 28, 5c per lb. advance.
Metal ¼ in. in width and less, 10c per lb. advance.
Any of the above widths cut to particular lengths, add 7c per pound.

COAL,

WHOLESALE.

Wholesale f.o.b. vessel at Cleveland:

Carbon Hill and Monday Creek	$2 65
Massillon	2 75@ 2 85
Brier Hill	3 25@3 75
Pittsburgh	3 00
Salineville	2 25
Tuscarawas	2 25

RETAIL.—Delivered.

Massillon Lump	$4 00
" Nut	3 75
Carbon Hill and Monday Creek, lump	3 75
Carbon Hill and Monday Creek, nut	3 50

75c less on cars by car load.

Anthracite Stove and Chestnut	7 15
Egg and grate	6 00

GLASS.

(Per box of 50 feet)

SINGLE THICKNESS

6x8 to 10x15	
11x14 to 15x24	
16x24 to 20x28	8 50
15x34 to 24x30	9 75
26x28 to 24x36	10 75
26x36 to 26x44	11 50
26x46 to 30x50	13
	14 00

DOUBLE THICKNESS

6x8 to 10x15	
11x14 to 15x24	11 7
16x24 to 20x28	13 25
15x34 to 24x30	15 75
26x38 to 24x36	17 25
26x36 to 26x44	18 50
30x50	21 25
30x52 to 30x54	22 50
30x56 to 34x56	23 25
34x58 to 34x60	25 00
36x60 to 40x60	27 75
	30 00

Dis 60 & 15 single, 60 & 20 double

OILS.

Pure Oils. packages included

Sperm, winter bleached per gal	1 25
Whale, winter bleached per gal	
Straits	63
"A" oil for tanner's use	50@53
Lard oil extra W S	35 @40
do No 1 do	1 05@1 10
do No 2 do	82@87
Tallow oil	72@77
Neatsfoot oil pure	75
do No 1	90@95
Linseed oil, raw	80@85
do do boiled	
Cotton seed oil white	64 @ 66
do do yellow	60 @ 63
West Virginia lubricating 28 deg	20c@30c
Pure Mecca	55@ 60
Paraffine oil winter pressed	25@ 30
Machinery	40
Engine	50
Miners' oil	40@45
Drilling oil	40

Hides and Leather.

Prime cured hides,	8@8½
Green hides	5@6
Bull, scrubby, badly scored or damaged, cured, two-thirds price.	
Prime dry hides	13@14
Horse hides, green	$1 5@2 50
Horse hides, dry	$2 00
Prime cured veal calf,	18
PrimeDeacon S, salted	65@70
Pelts, wool on	25@50
Fresh slaughter sheep	30@$1 50
Fresh slaughter lambs	50@60
Green calf skins	18
Hemlock rough	23@24
Oak harness	34@38
Oak sole	37@44
Union harness	31@33

MERCHANT & COMPANY,

Manufacturers of

SOLDER,

525 Arch St., Philadelphia.

WE ASK THE PATRONAGE OF THE TRADE FOR OUR SOLDER FOR THE FOLLOWING REASONS:

1st.—All our Solder is made on our premises and under our personal supervision.

2nd.—We guarantee proportions specified or do not require payment.

3rd.—We use nothing but best selected brands of new Lead and Pig Tin.

4th.—We do not use animony or any other metal to dress up the face of Solder.

5th.—We offer to make any specified mixture of Tin and Lead, guaranteeing same.

6th.—That we believe the question between manufacturer and consumer of Solder is not so much price as quality.

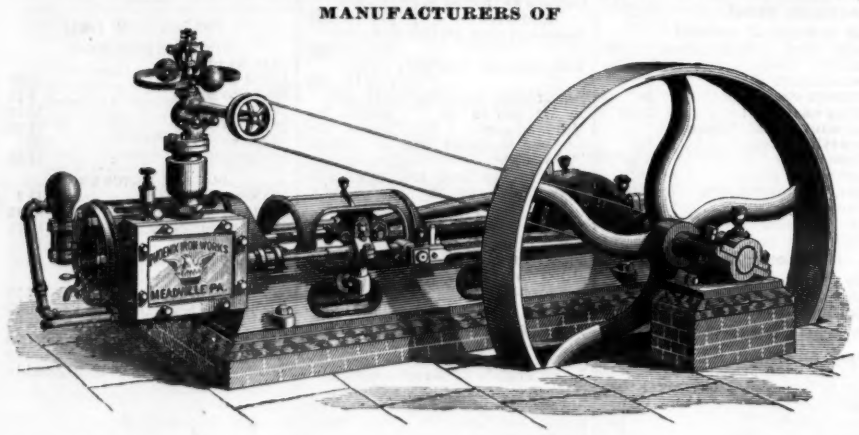
7th.—That we believe our M. F. Solder is the best ever offered to the trade, and cannot be surpassed.

8th.—That we guarantee our prices as low for same quality as any house in the country.

MERCHANT & CO.

PHŒNIX IRON WORKS,

MANUFACTURERS OF



Portable and Stationary Engines, Boilers, and Circular Saw Mills.

MEADVILLE, PA.

The American Tool and Machine Company.,

84 Kingston street, Boston Mass.,

—Manufacturers of the—

Celebrated Cabinet Turret, Screw Chasing, and Hand Lathes,

CHUCK'S SLIDE RESTS

And Valve Milling Machines for Brass Finishers.

Also the D. M. Weston Hydro Extractors

For Woolen and Cotton Mills, Hotels, Laundries, etc.

BENJAMIN F. RADFORD, Sup't.

Dayton Malleable Iron Co.,

Manufacturers of

Air Furnace Iron.

A full line of Carriage and Plow Hardware kept in stock.

☛Catalogues for the Trade.

Engines, Hoisting Machines

And General Machinery.

EXTRA HEAVY STEAM ENGINES and other machinery adapted for Rolling Mills, Forges, Mines, &c., specially designed to suit local requirements.

Light and Heavy Hoisting Machinery

of every description, adapted for either slow or rapid hoisting, and with or without Friction Clutches or Steam boilers, &c. I am now prepared to manufacture my recently designed

FRICTION BAND HOIST,

Specially designed for rapid hoisting, which for cheapness, simplicity, driving capacity, ease and reliability of operation will be found superior to any other hoisting machine in the market. Patterns changed or new patterns made in any case to suit local requirements.

To parties wishing to build newly designed machinery I give especial attention.

Designs and estimates for machinery, as a base for negotiations, forwarded on application. Promptitude guaranteed. Correspondence solicited.

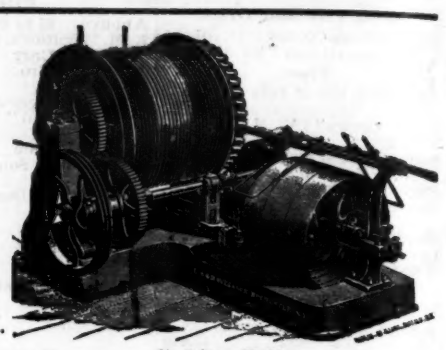
W. H. THOMPSON,
Phoenix Iron Works, Wason Street, Cleveland, Ohio.

Freight and Passenger

Elevators.

L. S. GRAVES & SON,
Cor. Center and Frank Streets,
ROCHESTER, N. Y.

end for our Catalogue.



No. 3 Screw Machine.

Glazed Windows.

CLEVELAND WINDOW GLASS CO.

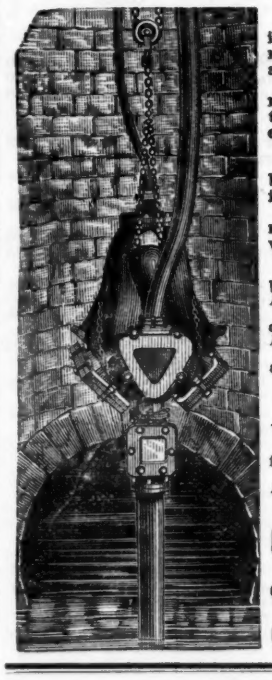
For Doors, Sash, Blinds and Windows,

American, French & Plate Glass

73 Michigan Street and 132 Champlain Street,
Cleveland, Ohio.

THE NEW PULSOMETER

As a Contractor's, Well Sinker's and Sewage Pump has no equal.



It is available in many cases where no other pump could possibly be used.

Its ability to raise sand, mud, and other substances without injury to its parts, its small cost and size, which allows it to be squeezed into narrow and confined spaces, and general handiness suggests its adoption, and has already established its reputation.

The annexed cut shows how it should be slung either with a chain or rope, by which it can be lowered as the work progresses. To facilitate the changing adjustment, a short piece of steam hose should be used either at the Pump or at the top of shaft.

The discharge pipe can be lengthened as the pump is lowered.

The capability of this Pump to deal successfully with mud from the bottom of rivers and sewage matter, has rendered it especially serviceable in important works of this kind.

It may be placed at a distance from the boiler operating it, it being only necessary to run a larger size steam pipe and protecting it from the weather with some non-conducting substance.

"A most excellent pump; can be hung in a tripod, and be raised and lowered by tackle, as conditions may require; uses steam very economically."—*Chicago, Burlington & Quincy R. R.*

"It worked to our entire satisfaction, throwing mud or water with equal ease; is as easy to run as a canal pump."—*Pompton Steel and Iron Co., Pompton, N. J.*

"In ease of management, economy of fuel and durability it seems without an equal."—*Bay State Brick Co., North Cambridge, Mass.*

"The best steam pump I ever used."—*Timothy Shea, Spencer, Mass.*

"We found it very efficient and satisfactory."—*Pennsylvania Steel Co., Steelton, Pa.*

"It is doing work that other pumps failed to do."—*Union Dredging Co., 83 & 84 Astor House, New York.*

"It gives us perfect satisfaction."—*McKiernan & Bergin, Paterson, N. J.*

"Is the admiration of all who inspect it. It throws water regularly, plentifully and easily."—*Golding & Co., Hockessin, Del.*

"In steady operation for two months and works very satisfactory."—*Logan Iron and Steel Works, Lewistown, Pa.*

Descriptive book with prices and testimonials mailed upon application to

PULSOMETER STEAM PUMP CO.,
83 JOHN STREET, NEW YORK, or to
CHICAGO OFFICE, 193 Lake Street,
FRANK GRAY, Manager.
BOSTON OFFICE, 32 Charlestown Street,
S. B. EVERETT, Manager.

THE MORGAN

Variable Blast Water Tuyere Iron.

With the front plate removed, showing the rotating air tubes through which four different currents of air may be passed thereby making any sized fire from two to eighteen in. diameter.

It actually saves one-half of the coal; makes an intense heat just where it is needed, and burns no coal unnecessarily. Always gives a centre blast, and cleans all the dirt from the fire. Supplies hot water.

We also furnish a Tuyere on same principle without Water Attachment. All goods guaranteed to please or no sale. Catalogue sent free.

Address, A. W. MORGAN & CO.
52 Vance Block, Indianapolis, Ind.

COATES'

"Independent Lock Lever"

HAY AND GRAIN RAKE.

Patented August, 1867, January, 1875, June, 1875, and November, 1876. 60,000 now in use. Light touch of lever and driver's weight dumps it. Best self-dump in market. Twenty steel teeth. No complicated ratchet wheels, friction bands or other horse machinery needed to operate it. A small boy rakes easily twenty acres per day with the Coates' Lock Lever. Send for circulars.

A. W. COATES & CO.
Alliance, Ohio.

Cleveland Business Directory.

Assayers and Analytical Chemists.

JUDSON, W, E, Ana ytical Chemist, 8 Cushing Block.

Bolt and Nut Works.

HOTCHKISS & GAYLORD, manuf'rs. Machine, Plow & Elevator Bolts, Coach Screws.

Boiler Makers.

SMITH & TEACHOUT—(Established 1857.) Boiler, Tanks, Stills etc. 439 Broadway.

Bridge Builders.

BUCKEYE BRIDGE AND BOILER WORKS mfrs of Arch & Truss Bridges, Boiler Tanks and Oil Stills. Bet. Wasson St. and Case Ave.

Coal and Iron Exchange.

JACKSON IRON CO. Iron Ore and Pig Iron. Rooms 8 and 9. Fayette Brown, Gen. Agent.

RHODES & CO. Coal, Iron Ore an Pig iron. Rooms 1 and 2.

Carriage Blacksmith.

STRIEBEL, CHAS. manfac'r. of Carriages and Wagons and platform trucks. Horse shoeing and general blacksmithing .93 Woodland ave.

Carriage Bolts.

THE COLWELL & COLLINS NORWAY BOLT CO., manufacturers of Philadelphia Carriage and Tire Bolts.

Church and School Furniture.

FAULHABER, GEO. manufacturer of School and Church Furniture. Fine Hard Wood work a specialty. 203 Ontario Street.

Custom Boots and Shoes.

ROONEY, JOHN manufacturer of hand-made Boots & Shoes, custom made and warranted 177 Ontario Street.

Carriage Repository.

GREENE'S, J. O., Carriage Repository, 408 Superior street and 52, 54 & 56 Rockwell street, dealer in Fine Carriages. Repair shop in connection.

SLATER, G. A., Carriage dealer, sells the best work for the lowest price. A fine assortment always on hand. Repository 365 Euclid Avenue.

Coal and Pig Iron.

ANDREWS, HITCHCOCK & CO., Briar Hill Coal and Pig Iron. 122 Water Street.

Electrical,

ELECTRIC SUPPLY CO. manfrs and dealers in Electric Burglar Alarms, Annunciators, Cell Bells and Batteries. Telephone lines built and repaired. 145 Seneca Street.

Fresco Artists.

KEMMER & KUSHMAN DECORATIVE CO., Fresco Artists, Fine Modern Wall Papers. 83 Euclid ave.

Foundries.

BOWLER & CO., Car Wheels, Patent Chilled Frogs, and all kinds of castings. 9 Winter.

CLEVELAND MALLEABLE IRON CO., manufacturers Malleable Iron Castins.

LAKE SHORE FOUNDRY, Water and Gas Pipe, Light and Heavy Castings. Alabama st.

TAYLOR & BOGGIS, successors to H. & H. F. Taylor, Iron Founders, 65 to 73 Central Way.

VIADUCT FOUNDRY COM'Y, Aenis, Carlin & Strangward manfrs of Machinery Castings Fine Light Castings a Specialty. Office & Works 11 13 15 and 17 Detroit Strert, near Center.

FITZSIMONS WM. & SON, Rolling Mill and Machinery castings. Rolls a Specialty. No. 435 Broadway.

File and Saw Works.

PARKIN, W. H. & CO., Hand-cut Files and Rasps, dealers in Disston's saws, 11 So. Water

Flue Cleaner.

CLEVELAND FLUE CLEANER M'F'G. CO. manufacturer of Aitchison & Doolittle's Patent Steam Flue Cleaner, 22 & 24 Power Block.

Hotels.

FOREST CITY HOUSE, cor. Public Square and Superior st., Terrill & Ingersoll, Props.

KENNARD HOUSE, D. McClasky, Prop.

NEW ENGLAND HOTEL, Water st., W. W. Wolcott, Prop. Refitted and refurnished.

STRIEBINGER HOUSE, between Ontario and Seneca sts. $2.00 per day. Hawley & Langton

CITY HOTEL, Seneca street. H. B. West, proprietor. $1.50 per day.

Hides, Pelts and Leather.

DENNISON BROS., dealers in Hides, Pelts, Furs and Tallow, 48 and 50 River street.

Hardwood Lumber.

MARTIN, J. T. dealer in Hardwood Lumber, Stone's Levee, near Central Way.

Lumber.

WOODS, PERRY & CO., manufacturers and dealers in Lumber, Lath, etc., 5 Carter st.

FISHER, WILSON & CO., wholesale lumber dealers (pine & hard wood), rough and dressed umber, timber, lath, shingles, etc. 47 Central Way

KRAUSE, C. A., & SON, wholesale and retail dealers in lumber. Yards cor. Superior and Wason and 281 Merwin streets.

Cleveland Business Directory.

Hardware and Iron.

BINGHAM, WM. & CO., Hardware, Iron, Nails and Metals, 148 and 150 Water street.

CLEVELAND ROLLING MILL CO., manuf'rs. of Steel and Iron Wire and Steel Tire.

WORTHINGTON, GEO. & CO., Hardware and Dealers in Metals. Water street.

Lime Manufacturers.

RUSSELL LIME CO., manufacturers of White Lime; also dealers in Plaster, Cement, etc. 85 Elm street.

Machinery and Boilers.

CLEVELAND STEAM FURNACE CO., Engines and Boilers, cor. Detroit and Center sts.

KRITCH, K. E. Metal Pattern Maker. Small machinery repaired. Lawn Mower sharpening a specialty. 42 South Water Street.

Machinery Depot.

CLEVELAND MACHINERY DEPOT, (now National Machinery Depot.) The largest stock of New and Second-hand Engines, Boilers and Machinists' Tools. Shop and Warehouse corner Bond and Superior streets.

Mercantile Agency.

THE MERCANTILE AGENCY. R. G. Dun & Co. proprietors. 121 Superior street.

Oil Manufacturers.

AMERICAN LUBRICATING OIL CO., manufacturers of lubricating oils, 23 Euclid ave.

Paints and Oils.

MASTERS, J. N. jobber in Paints, Oils, Varnishes. Brushes, 34 Prospect st.

Pattern and Model Makers.

WHITTINGHAM, J. & C., Metal Pattern and Model makers. 52 Canal Street.

REID, J. C., Pattern and Model Maker. 52 Canal Street., (Up Stairs.)

COTTRELL & CO., W. L., Pattern Makers, 53 Center street.

STAIR BUILDER.

PFEIL, CHAS, Stair Builder; Hard Wood Mantles and Office Railing. Works, 49 & 51 Canal street, Cleveland, Ohio.

JOHNSON & PURSER, Stair Builders. and manuf'rs of Mantels, Odd Pieces of Furniture, &c. 30 West street, up stairs.

Steel Stamps and Stencils.

FLEHARTY, J. H. & CO., Rubber Stamps, Seals, Stencils. 197 Superior street.

Steam Furnaces.

CUYAHOGA STEAM FURNACE CO., Manfrs of Land and Marine Engines. Machinery for Blast Furnaces, Rolling Mills, Bessemer Steel Works, &c. Mill-Gearing and all kinds of Castings, Foundry, Machine and Boiler Shops.

Tanners.

GAENSSLEN BROS., Tanners, and dealers in leather, oil and shoe findings. 80 Water-st.

Trunks and Valices.

FABER, J. manuf. Trunk, Traveling Bags and Ladies' Fine Satchels. Sample Trunks and Cases a Specialty. 56 Public Square.

Vessel Agents.

WEBB, H. J. & CO., Ship Brokers and Vessel agents. 17 & 18 Board of Trade Building. 122 Water Street.

Wood Carving.

HERKOMMER, J., Carver and Ornamenter in Composition. 225 Erie street.

Business Directory.

Akron, O.

AKRON IRON CO., manufacture best Common, Refined and Charcoal Iron.

CASCADE HOUSE, cor. Mill and Summit sts., near Depot. J. Downie, Prop.

MCNEIL, J. C., Steam Boilers, Heavy Sheet Iron Work. Repairing promptly executed.

PERKINS, C. E., dealer in Agricultural Implements, machinery, and Manufacturers' Ag'nt

TAPLIN, RICE & CO., manuf'rs. of Stoves and Hollow Ware, dealers in Tinners' Stock, etc.

WEBSTER, CAMP & LANE MACHINE CO., Founders and Machinists, 12 Main street.

AKRON POLISHING & PLATING WORKS. Man'f'rs of solid leather wheels for polishers.

Alliance, O.

ARLINGTON HOUSE, cor. Main and Liberty Streets. Centrally located. Sample Room for Commercial Travellers. H. S. Adams, proprietor

MCFARLAND, J. W. Engine and Machine Builder, and General Machine Jobbing.

Cuyahoga Falls, O.

THOMAS BROTHERS, manfrs of Ohio Stone Ware. Cuyahoga Falls Stone Ware Factory, cor. Main and Broad streets,

TURNER, VAUGHN & TAYLOR, manufacture engines, presses and grinding machinery for clay; also paper, chain, wire and flour mill machinery. Send for Circulars and price list.

SNYDER, H. wholesale manu acturer of Sash, Doors, Blinds, &c. Send for Price Lists.

THE CUYAHOGA FORGE AND IRON CO., manfrs. of every description Car, Truck and Driving Axles, Forging, Shafting. &c.

Canal Dover, O.

HECKMAN, E., manufr. and dealer in harness leather, upper, kipp and calf. Also, manufacturer & dealer in prime English Dairy cheese. Highest market cash price paid for hides.

Business Directory.

Columbus, O.

PAT. ADJUSTABLE WINDOW CURTAIN Cornice, manufactured by Strader's Curtain Cornice Works.

ROYCE & PULLING manufrs of Patent Steam Pumps for all purposes. Store room 30 High street. Works Nos. 5 and 7 Scioto street.

U. S. CARRIAGE CO. builders of fine Carriages, Buggies and Phætons. Salesrooms and Office 257, 259 and 261 Fourth street.

REYNOLDS BROS., manufacturers of hand-cut Files and Rasps. Old files re-cut. Send for Price List.

CITY BOILER WORKS, manfrs of Stationary, Portable and Locomotive Steam Boilers. All work warranted. Borger Bros. & Co.

MURRAY, HAYDEN & CO., manfrs of Malleable Iron. Cor. Randolph & West streets.

Canton, O.

DIEBOLD SAFE & LOCK CO., manuf'rs. Safes, Locks, Bank and Safe Deposit Works.

NOVELTY IRON WORKS, Mill work, Shafting, engines, Imperial job printing press, etc

NEW AMERICAN HOUSE, Canton. Fred. Hipp, Prop.

EBERSOLE & KAILEY, Machine and Jobbing Shops. Gearing for Patterns or Machinery a specialty. Models of all kinds made & repaired.

Geneva, O.

THE ENTERPRISE MACHINE CO., L. L. Crane, Pres't, manfrs of Machinists' Tools and Machinery. Gear Cutting a specialty.

Lima, O.

LIMA HOUSE, centrally located; telegraph office in the house. J. Goldsmith, Prop.

Massillon, O.

CITY CARRIAGE WORKS, P. H. Young, prop. manfact'r of Carriages, Phætons and Spring Wagons. Work warranted. Cor. Tremont & Erie.

Painesville, O.

NORTH AMERICAN CUTLERY CO., m'fr's of Steel Shears and Scissors—best quality.

Ravenna, O.

THOMPSON, T. F., dealer in Agricultural Implements, farm machinery, hardware, seeds, fertilizers, &c. Cor. Main and Prospect sts.

BALDWIN, D. L. & SON, Contractors & Builders and manfrs of all kinds of Moulding, flooring, siding, &c. Rip, Band and Scroll Sawing.

Steubenville, O.

DORRANCE, D.W., Tool Works, manufacturer of hand-made miners' and stone-cutters' Tools Promp attention given to mail orders.

Sandusky, O.

SANDUSKY WHEEL CO. manfrs. of Sarven Patent Wheels, Carriage Bodies and Seats, Plain Wood Hub Wheels, Banded Hub Wheels, Jacobs' Patent Neck Yokes.

Toledo, O.

BAKER, HERBERT, Machine Shop and Iron Foundry. 98 and 100 Erie street.

TOLEDO FOUNDRY AND MACHINE CO. builders of Steam Engines, Circular Saw Mills and all kinds machinery. Water St., cor. Cherry

RUSSELL IRON WORKS, mnfrs. of Architectural Iron Work, castings, pulleys, shafting and steam bending machinery. Cor. Water and Lagrange streets.

STANDARD SAW WORKS, H. Bartley, manufacturer and dealer in Saws of every description. All kinds of Springs made from Sheet Steel. Reaper, Hay Knives Truss Springs, &c. made to order. 92 St. Clair Street.

UNION Wooden Ware Manufacturing Co. manufacture Sewing machines, washboards, children's wagons, carts, wheelbarrows, sleds, kitchen wooden ware, &c.

HEPBURN BROTHERS, proprie. Union Boat Works. Boats of all kinds made to order. For sale or rent. Water Street foot of Cherry.

Youngstown, O.

BELL, EDWIN & SON, manuf. of Nail Kegs, Pat. coiled hoops, slack barrel and keg heading and oil barrel stock.

INGLEDY, G. H. dealer in rough and dressed Lumber, Shingles and Lath.

MORTON HOUSE, formerly Maitland House, James Morton, Prop.

TOD HOUSE, cor. Diamond and Market streets. Henkel & Bowman, Props.

Zanesville, O.

KIRK HOUSE, William Kirk, proprietor. $1.50 per day.

Rochester, Pa,

OLIVE STOVE WORKS, (limited) manufacturers of Stoves and Hollow Ware.

Erie, Pa.

GUNNISON, A. B., wholesale manufacturer of Wood Pumps. 233 East Twenty-Second St.

BALL ENGINE CO., limited, manufacturers of Automatic Engines of 15 to 30 horse power

NOBLE SEWING MACHINE CO. manfrs of the New Noble Sewing Machine. Send for circulars and prices.

A. B. FELGEMAKER & CO. Church Organ builders. Descriptive catalogue furnished on application.

Business Directory.

Titusville, Pa.

FOSTER & MCKAY, dealers in boilers and engines, tubing, casing, old iron, rope, and all kinds of metals. Washington street, nr. Railroad.

Meadville, Pa.

CURRY & CO. general Jobbers in Castings of al kinds.

Oil City, Pa.

REID, JOS. Machinist, steam engine and pump repairing. Brass and aron castings, light and heavy, made on short notice.

Sandy Lake, Pa.

EBERMANN, W. S. & SONS, manfrs. of the celebrated Ebermann Boiler Feeder. Send for Circulars and Price List.

Pittsburgh, Pa.

PRINTING PRESSES. W. A. Bunting, manufacturers' agent. Printers supplies, type, cards. 42½ Sixth Street. [Up stairs.]

BAIR & GAZZAM, practical machinists; gear cutting a specialty. Rice's Feed Water and Heater. 17 Wood street, corner First Avenue.

Wheeling, W. Va.

EXCELSIOR MACHINE WORKS, Redman & Co., general machinists and manufacturers of Marine and Stationary Engines, Hangers, Pulleys, Shafting, &c. Cor. 18th & Chapline streets.

Louisville, Ky,

HAIGHT, ROBERT, Gold, Silver and Nickel Plating and Brass Finishing Shop. Car Trimmings and Steamboat work a specialty. 1 West Market street

Union City, Ind.

LAMBERT, J. W. & CO., mfrs of fork, rake, hoe and broom handles; spokes, hubs, whiffletrees, yokes, plow-rounds. &c. Correspondence solicited.

Olean, N, Y.

MYRICK BROS. & CO., manufact'rs Engines and Boilers, oil drilling tools, rig irons, etc.

Rochester, N, Y.

GOWE, JNO. N., mfrs. of Specialties, such as Machine forging, bridge bolts and trusses, railroad switches, spike, mall, chisels, &c.

ELEVATORS for Hotels, Factories and Private Houses. J. S. GRAHAM & CO.

WOOD-WORKING MACHINERY. Send for Catalogue. J. S. GRAHAM & CO.

RAZOR STROPS. Sole mfrs. of all kinds of Razor Strops. Uischt, Linn & Co. 131 N. Water

Buffalo, N. Y.

SANDS, PAUL, Marine and Stationary Steam Engine Works mfr. of drilling machines, foot and power lathes. 70 Columbia street.

EMPIRE STATE MF'G CO., O. F. Swift, prop'r, manfr of Fluters, Sad Irons, Spun Copper & Half Copper Tea Kettles. Washington, cor. Ohio

WHITE, L. & I, J. manf'r's of Coopers' Tools, Carpenters' Tools, and Ship Tools Also manf'r's of Planer Knives and Machine Cutters to order 310, 312, 314 Exchange street.

THE BUFFALO NUT AND BOLT CO. [Limited.] Manufrs. of Hot Pressed Nuts, Bolts, Washers, Rivets, &c. No. 226 Ohio Street.

Rheims, N. Y.

GREAT WESTERN CHAMPAGNE. Finest made in America. Equal to best imported. Has taken highest awards everywhere, and is used all over the Continent. Try a case, and you will have no other. Pleasant Valley Wine Co., Rheims, N. Y.

Brattleboro', Vt,

A JOY FOREVER!

ESTEY ORGANS

Manufactured by

J. ESTEY & CO.,

Brattleboro', Vt.

(Catalogue free on application.)

CLEVELAND ELECTROTYPE FOUNDRY 55 FRANKFORT STREET CLEVELAND, O. 55

CLEVELAND NON-CONDUCTING CO.

MANUFACTURERS & DEALERS IN ASBESTOS, HAIR FELT, CEMENT, & OTHER

Pipe Coverings,

19 SOUTH WATER STREET,

CLEVELAND, OHIO.

TRAVELERS' REGISTER.

Lake Shore & Michigan Southern.

Trains marked with a * are the only trains that arrive and depart in this city on Sundays.

ARRIVALS.	a.m.	a.m.	p m.	p.m.
Through from East	*2 50	*6 35	1 25	*1 40
Through from East	.....	.....	.....	*7 05
N. Y. & Chicago Ex	.....	12 23	.....	.....
Conneaut Accommoda'n	8 40	.....	.....	.....
Nottingham Accom'd'n	†10 05	.....	14 45	.....
Elyria Accommodation	8 50	.....	.....	.....
From West via Sandusky	*7 05	11 00	.....	10 12
Fast Express	*1 35	.....	.....	.....
From West via Norwalk	.....	11 00	2 25	10 10
Pt. Clinton Acco.n'dat'n	.....	11 00	.....	.....

DEPARTURES.	a.m.	a.m.	p.m.	p.m.
Through Eastern Train	*7 50	11 15	*2 55	10 35
Fast N. Y. Express	*1 50	.....	.....	.....
Conneaut Accommod'n	.....	.....	4 50	.....
Nottingham Accom'd'n	†9 00	.....	12 15	.....
Elyria Accommodation	.....	.....	5 00	.....
West via Norwalk	6 40	.....	3 30	*7 35
West via Sandusky	8 05	7 00	*2 05	5 00
N. Y. & Chicago Ex	.....	12 33	.....	.....
Pt. Clinton Accom'dat'n	.....	.....	5 00	.....

Cleveland, Columbus, Cincinnati & Indianapolis.

ARRIVALS.

No. 2 Col. & Cin. & Ind'pous Ex. ..... *7 10 A.M
No. 8 C. T.V. & W. & Clev. Accom..... 10 30
No. 12 St. Louis & New York Exp..... *3 00 P.M
No 6 Indianapolis & Columbus Exp.... 10 20
No. 10 Wheeling & Cleveland Exp. 7 15
No. 4 Special Cin. & New York Exp.... *3 40

DEPARTURES.

No. 1 Cincinnati & Columbus Exp..... 8 00 A.M
No. 11 Cleve, Indianap. & Wheel'g Ex... 7 10
No. 3 Special St. Louis & Cincinnati Ex. 1 55 P.M
No. 5 Night Express, ... *7 25
No. 7 C T.V. & W. & Col. Accom 4 00

†This train runs daily to Indianapolis and St. Louis, and daily, except Sunday, to Cincinnati.

Cleveland, Tuscarawas Valley & Wheeling.

ARRIVALS.

Wheeling & Cleveland Express..... 8 25 P.M
Uhrichsville Express..... 10 30 A.M

DEPARTURES.

Wheeling & Cleveland Express..... 7 15 A.M
Uhrichsville Express ..... 4 00 P.M

New York, Pennsylvania & Ohio.

ARRIVALS.

No. 7 Mahoning Valley Accommo.. ....10 55 A.M
No. 3 New York Express, ... *7 00 P.M
No. 1 New York Express, ... 6 50 A.M
No. 3 Pittsburgh Express, ... *7 00 P.M
No. 5 Pittsburgh Express, ... 2 00
New York Express..... 2 00
No 9 Youngstown and Pitts. Local..... 10 15

DEPARTURES.

No. 12 New York Express, ... *7 10 A.M
No. 4 Youngstown Local, ... 11 00
No. 8 Mahoning Accommodation, ... 4 25 P.M
No. 2 New York Express, ... 10 45
No. 12 Pittsburgh Express, ... *7 10 A.M
No. 6 Pittsburgh & Main Line Express.. 2 30 P.M

Cleveland & Pittsburgh.

	ARRIVE.	DEPART
Pittsburg & Wheeling	1 45 P.M	8 50 A.M
Express	6 55	2 30 P.M
Alliance Accommodation	10 15 A.M	3 45
Ravenna Accommodation	8 35	5 35
Night Express	6 30 A.M	†11 40 P.M

† Night Express runs daily, except Saturday, by way of Wellaville, and on Saturday by way of Alliance.

Valley Railway.

ARRIVE.	DEPARTUPES.
No. 2 Accom... 10 15 A.M	No. 1 Mail ... 8 15 A.M
No. 6 Express...1 35 P.M	No. 3 Accom. 2 30 P.M
No. 4 Mail .....6 30 P.M	No. 5 Exp.....6 05

Special trains leave on Sunday at 8.30 A. M. and 4.20 P. M., arriving at Cleveland at 10 A. M. and 6.25 P. M.

Trains leave from Depot foot of South Water Street.

Connotton Valley Railway.

Arrive.	Depart.
No. 1 .....10 05 A.M	No. 4..... 10 05 A.M
No. 3..... 4 00 P.M	No. 2 .....4 40 P.M

All trains arrive and leave depot corner Commercial and Fifth Streets

Cleveland, Akron & Columbus Railroad,

Cleveland, Akron & Columbus Railroad, running over Cleveland & Pittsburgh Railroad to Hudson, for Akron, Columbus, etc.

	ARRIVE.	DEPART.
Mail	1 15 P.M	8 00 A.M
Express	7 25	1 50 P.M
Accommodation	10 10 A.M	3 45 P.M

CLEVELAND & PITTSBURGH

RAILROAD.

Trains leave Cleveland and arrive at the points named below as follows: Night Express runs daily, all other trains dail \except Sundays.

	Mail.	Fast Line.	Accom.	Night Expr'ss.
Leave Cleveland	8 50 am	2 30 pm	3 45 pm	11 40 pm
Arrive Hudson	10 00	3 28	4 50	12 50 am
Ravenna	10 40	3 58	5 50	1 18
Alliance	11 25	4 25	6 05 pm	2 05
N. Philadel	11 35 pm	7 15	.....	10 55
Salem	12 25	.....	.....	3 02
Canton	12 28	5 47	.....	3 20
Massillon via Alliance.	12 50	6 06	.....	3 38
Akron	10 42 am	4 10	5 40 pm	.....
Pittsburgh	3 30 pm	7 45	.....	6 55
Wheeling	5 10	8 00	.....	8 55
Marietta	8 45	.....	.....	.....
Harrisburg	.....	4 15 am	.....	4 00 pm
Philadelphia	.....	7 50	.....	7 35
New York	.....	11 15	.....	10 35
Baltimore	.....	7 55	.....	7 20
Washington	.....	9 17	.....	8 47
Boston	.....	8 00 pm	.....	.....

Ravenna Accommodation leaves Cleveland at 5:30 p m, reaching Ravenna at 7:15 p m; Akron 7:23 p m.

Newburgh Accommodations leave Cleveland at 11:00 a m and 12:30 pm. Returning, leave Newburgh at 11:10 am and 1:30 pm.

Passengers for New York, Philadelphia, Baltimore, Washington, and all points east of Pittsburgh make but one chang of cars, viz. at Union Depot, Pittsburgh, excepting those leaving on the Fast Line which has Pullman Sleepers from Cleveland to Philadelphia and New York.

The Fast Line leaving at 2:30 P. M. has elegant Pullman Palace Sleeping Cars through from Cleveland to New York without change. Pittsburgh Passengers who desire Parlor Car accommodations can secure seats in this car.

The Night Express has Pullman Sleeping Cars from Cleveland to Pittsburgh which can be occupied by passengers at Union Depot, Cleveland, any time after 9:00 P. M. At Pittsburgh passengers can take elegant through Parlor or Sleeping Cars for the East.

Sleeping and Parlor Car accommodations from Cleveland and Pittsburgh eastward can be secured at the Union Sleeping and Parlor Car Office Union Passenger Depot; of H. C. Marshall, Union Ticket Office, Weddell House; or of the Ticket Agent at the Euclid Avenue Station.

Through tickets can also be secured at the same points. Baggage checked through from the Union Depot or from Euclid Avenue Station,

By the 8:50 A. M. train a through car leaves daily for Akron, Gambier, Mt. Vernon, Columbus and immediate points, without change.

The 2:30 P. M. train has through car for Akron, Orrville, Columbus and immediate points, arriving in Columbus at 9:25 P. M.

By the 3:45 P. M. Accommodation train cars run through without change from Cleveland to Cuyahoga Falls, Akron and Millersburgh,

Night Express leaving Cleveland at 11:40 P. M., runs daily, and makes connection at Wellsville for Steubenville, Bridgeport, Wheeling, Bellaire and intermediate points. Every night in the week except Saturday the night express runs via Wellsville. On Saturday nights it runs via Alliance. All other trains run daily except Sunday.

Trains arrive at Cleveland.—Night Express at 6:30 P. M., having Pullman Sleeper from Pittsburgh; Ravenna Accommodation, 8:35 A. M., Alliance Accommodation, 10:15 A. M.; New York Wheeling & Washington Mail, with Pullman Sleeping Car from New York and Philadelphia, 1:45 P. M.; New York, Philadelphia & Wheeling Express, 6:55 P. M.

WM. A. BALDWIN, General Manager. **E. A. FORD,** Gen'l Pass. & Tkt. Agt. Pittsburgh, Pa.

C. L. KIMBALL, District Passenger Agent, corner Bank and St. Clair streets, Cleveland.

Cleveland to New York,

VIA THE

NEW YORK, PENNSYLVANIA AND OHIO RAILROAD.

Formerly Atlantic & Great Western Railroad.]

For New York, Boston and the East. The shortest and quickest route to Pittsburgh, Washington, Baltimore and the Southeast

Until further notice trains will leave the new Central Depot, South Water Street and Viaduct, as follows:

7:10A.M. LIGHTNING EXPRESS, (daily,) sleeping and hotel coaches from Leavittsburg. 8:55 a.m. To New York, Albany and Boston without change. Parlor car, Cleveland to Salamanca. Arrives at Meadville 11:20 a.m., (dinner); Franklin, 12:33 p.m.; Oil City, 1:00 p.m.; Corry, 1:00 p.m.; Jamestown, (Lake Chatauqua) 1:57 p.m.; Buffalo, 6:15 p.m.; Rochester, 8:30 p.m.; Hornellsville, 6:40 p.m., (supper); Corning, 8:25 p.m.; Elmira, 8:57 p.m.; Binghampton, 10:58 p.m.; Albany, 6:00 a.m.; Boston, 2:45 p.m.; arriving at New York, 6:50 a.m.

10:45 P.M. NIGHT EXPRESS, (daily except Sunday), Sleeping Coach from Leavittsburg to New York without change. Arrives at Youngstown 1:45 a.m.; Meadville, 8:50 a.m.; Corry, 5:20 a.m.; Jamestown, 6:22 a.m.; Buffalo, 9:45 a.m.; Rochester, 1:10 p.m.; Hornellsville, 11:20 a.m.; Corning, 12:53 p.m.; Elmira, 1:21 p.m.; Binghampton, 2:50 p.m.; New York, 9:25 p.m.

2:30 P.M. PITTSBURGH EXPRESS,—daily, through without change. Parlor Car, Cleveland to Pittsburgh, arrives at Youngstown, 5:00 p.m.; Pittsburgh, 7:48 p.m.; Washington, 7:30 a.m.; Baltimore, 8:15 a.m.; via Sharon and Sharpsville to Meadville 7:40 p.m.; Corry, 9:10 p. m.; Lakewood, 9:50 p.m.; Jamestown, 10:00 p. m.; Salamanca, 11:10 p. m.

4:25 P.M. MAHONING ACCOMMODATION, stopping at all way stations. Arrives at Youngstown, 7:25 p.m; Sharon, 8:30 p.m; Sharpsville 8:40 p.m; connects at Leavittsburg with train No. 20 for Meadville and intermediate points, arrives at Meadville, 11:05 p.m. Pittsburgh, 10:48 p. m.

7:10 A.M. PITTSBURGH EXPRESS,—(daily) through without change. Arrives at Youngstown, 9:50 a.m.; Sharon, 10:55 a.m.; Sharpsville, 11:05 a m.; Pittsburgh, 12:45 p.m. Returning, leave Pittsburgh, 4:48 a.m., 8:33 a.m., and 1:18 p.m. and 4:20 p.m.

11:00 A.M. YOUNGSTOWN & PITTSBURGH Accommodation, stopping at all Way Stations, arriving at Youngstown 1:50 p.m.; Pittsburgh, 6:10 p.m. Trains arrive at Cleveland, 6:50 a.m., 10:55 a.m. 2:00, p.m. 7:00 p.m., and 10:15 p.m.

☞ This is the only route by which passengers can reach Corry, Elmira, Binghampton, New York City, and intermediate points WITHOUT CHANGE. No change to Boston and New England cities.

Baggage Checked Through to All Points East

☞ Through Tickets and information regarding the route can be obtained at the Union Ticket Office, corner Bank and Superior streets; at office 131 Bank street, and at new Depot of New York, Pennsylvania and Ohio Railway, South Water street and Viaduct, Cleveland.

A. E. CLARK, Gen. Pass'r. Agt., Cleveland, Ohio.

M. L. FOUTS, Pass. Agt., 131 Bank st., Cleveland.

P. D. COOPER, Gen. Man'gr. Cleveland.

NOTICE.—Hereafter all Passes must be returned to the General Passenger Agent within FIVE DAYS after date of expiration; otherwise they will be discontinued.

Blue Grass Route of Ohio

TIME TABLE.

The Cleveland, Mt. Vernon and Delaware RAILROAD.

GEO. D. WALKER, RECEIVER.

SOUTH-BOUND TRAINS.

STATIONS.	Accom	Accom	Expr	Mail	Sundays only
Leave.	P. M.	P. M.	P. M.	A.M.	P.M.
Cleveland	5.30	3.45	2.30	8.50	.....
Hudson	6.53	5.02	3.35	10.10	4 20
Cuyahoga Falls	7.11	5.30	3.53	10.29	4 40
Akron	7.23	5.46	4.10	10.42	5 00
*North Portage	P.M.	6.00	4 24	10.54*	6 14
Clinton	.....	6 19	4.44	11.09	5 31
Warwick	.....	6 29	4.49	11.14	5 37
*Marshallville	.....	6.43	5.02	11.27*	5 50
Orrville	.....	6 58	5.14	11.42	6 02
*Apple Creek	.....	7.17	5.32	11.58*	6 22
Fredricksburg	.....	7.32	5.45	12.11	6 37
*Holmesville	.....	7.43	5.55	12.21*	6 48
Millersburg	Accom	7.55	6.08	12.34	7 00
	A. M.	P.M.			A.M.
Millersburg	5.50	.....	6.08	12.34	7 00
*Killbuck	6.02	.....	6.20	12.47*	7 12
*Black Creek	6.13	.....	6.31	12.59*	7 25
	6.33 B	.....	6.51		
Gann	6.53 B	.....	7.11 S	1.19	7 47
Danville	7.04	.....	7.20	1.29	7 59
Howard	7.13	.....	7.29	1.38	8 10
Gambier	7.22	.....	7.38	1.47	8 20
Mt. Vernon	7.35	.....	7.51	2.00	8 33
*Bangs	7.45	.....	8 01	2.11*	8 45
*Mt. Liberty	7.53	.....	8.09	2.20*	8 54
Centerburg	8.05	.....	8.18	2.30	9 05
*Condit	8.19	.....	8.32	2.44*	9 19
*Sunbury	8.27	.....	8.40	2.53*	9 28
*Galena	8.32	.....	8.45	2.58*	9 34
Westerville	8.48	.....	9.00	3 15	9 50
Arrive at Columbus	9.15	....	9.25	3.40	10 20
	A.M.		P.M.	P.M.	A.M.

NORTH-BOUND TRAINS.

STATIONS.	Expr	Mail	Accom	Accom	Sundays only
Arrive at	P M	P.M.	A. M.	A. M.	A.M.
Cleveland	1 45	6 55	10.15	8.20	.....
Hudson	12.35	5.48	8.53	7.15	10.30
Cuyahoga Falls	12.16	5.30	8.33	6.58	10.11
Akron	12.03	5.17	8.20	6.45	9.50
*North Portage	11.46	5.00*	8.03	A. M.	9.34
Clinton	11.30	4 44	7.46	.....	9.18
Warwick	11.25	4 37	7.37	.....	9.12
*Marshallville	11.10	4.27*	7.23	.....	9.00
Orrville	10.57	4.14	7.10 B 6.40 S	.....	8.47
*Apple Creek	10.40	3.56*	6 22	.....	8.27
Fredricksburg	10.26	3.43	6.08	.....	8.13
*Holmesville	10.16	3.33*	5.58	.....	8.02
Millersburg	10.05	3.22	5.45	Accom	7.50
			A. M.	P. M.	P.M.
Millersburg	10 05	3.22	.....	8.35	7.25
*Killbuck	9 51	3.08*	.....	8.23	7.13
*Black Creek	9.39	2.57*	.....	8.11	7.00
Gann	9.17	2.36	.....	7.49	6 38
Danville	9.07	2.27	.....	7.39	6.25
Howard	8.58	2.18	.....	7.29	6.14
Gambier	8.49	2.09	.....	7.14	6 03
Mt. Vernon	8.37	1.57	.....	7.02	5.51
*Bangs	8.22	1.40*	.....	6.46*	5.37
*Mt. Liberty	8.14	1.31*	.....	6.37	5.28
Centerburg	8.05	1.22	.....	6.28	5.17
*Condit	7.51	1.09*	.....	6.14	5.03
*Sunbury	7.42	1.01*	.....	6.06	4.53
*Galena	7.37	12 56*	.....	6.00	4 47
Westerville	7.20	12 40	.....	5.43	4 30
Leave Columbus	6.55	12.15	.....	5.15	4.00
	A. M.	P.M		P. M.	P.M.

* Stop on signal. B Breakfast. S Supper.

Special Round trip rates will be made for Sunday trains.

The Blue Grass Route of Ohio (Mt. Vernon line) will abandon their regular Sunday trains after September 10th, 1882

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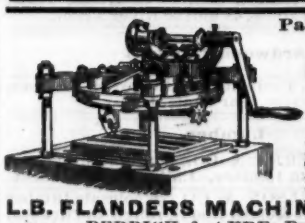

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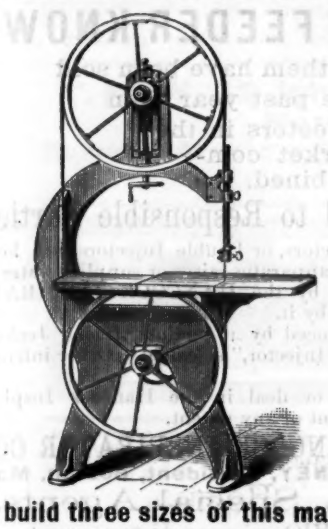

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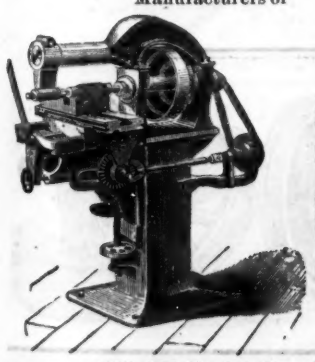

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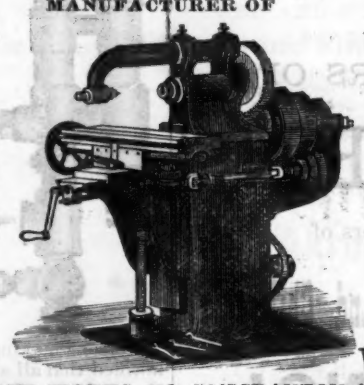

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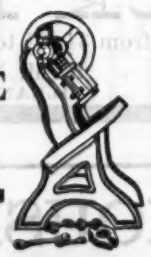

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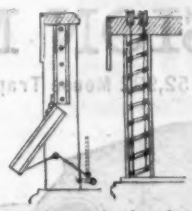

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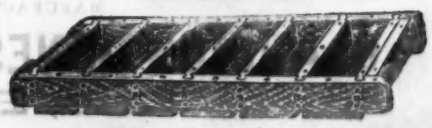

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On the 23d of June a suit in chancery was commenced by it against James Jenks, of Detroit, Mich., for making and selling the "Duplex Injector," so-called. Other infringers will be promptly sued.

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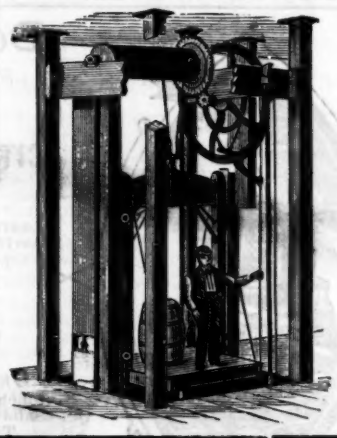

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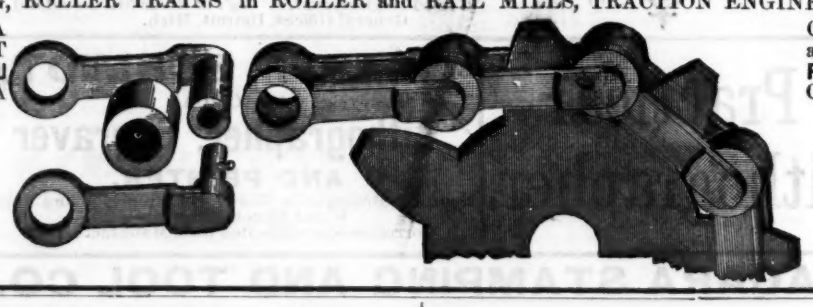

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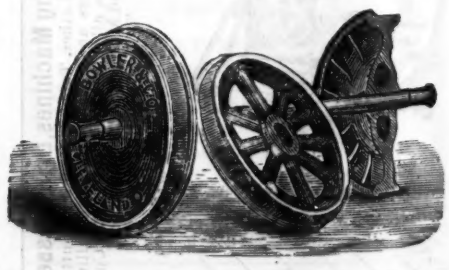

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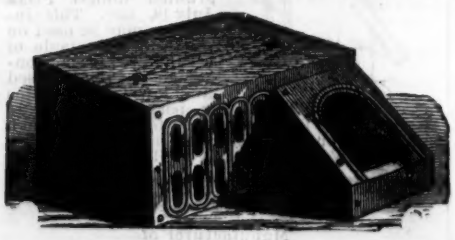

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"The mouse goes in to get the bait
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And then he jumps right through a hole
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He's in a cage, some how or other,
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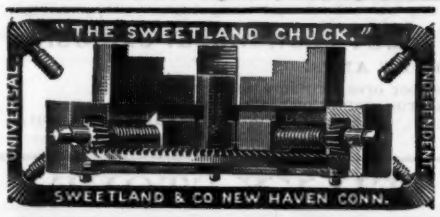

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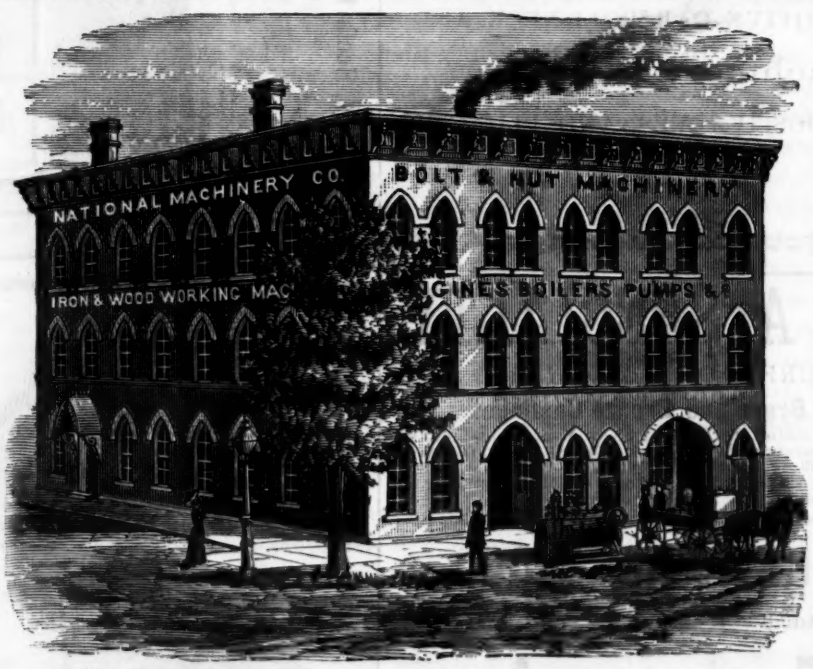

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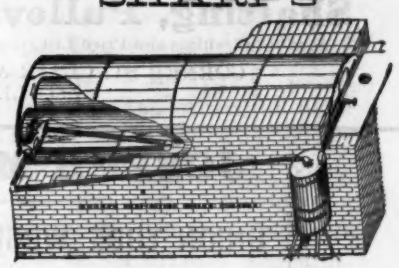

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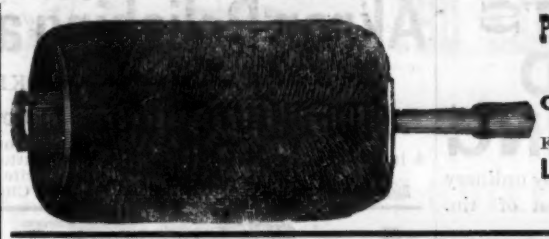

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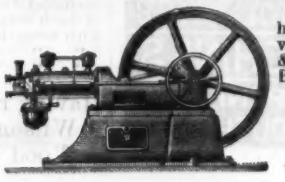

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